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PROJECT SPECIFIC PLAN FOR DELINEATING KNOWN EXCEEDANCES OF THE ON-SITE DISPOSAL FACILITY WASTE ACCEPTANCE CRITERIA IN AREAS 3B/4B/5

SOIL AND DISPOSAL FACILITY PROJECT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JULY 23, 2002

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

000001

20810-PSP-0004
REVISION 1

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20810-PSP-0004

Revision 1

July 23, 2002

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7/23/02

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7/23/02

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REVISION SUMMARY

Revision	Date	Description
0	5-1-02	Initial Issuance.
1	7-23-02	Revised to incorporate V/FCNs 20810-PSP-0004-01 and 20810-PSP-0004-02 due to Ohio Environmental Protection Agency disapproval.

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LIST OF ACRONYMS AND ABBREVIATIONS

ASCOC	area-specific constituent of concern
ASL	analytical support level
ccpm	corrected counts per minute
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	constituent of concern
DOE	U.S. Department of Energy
DQO	Data Quality Objective
FACTS	Fernald Analytical Computerized Tracking System
FEMP	Fernald Environmental Management Project
FRL	final remediation level
ICP/MS	inductively coupled plasma/mass spectrometry
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/kg	milligram per kilogram
OSDF	On-Site Disposal Facility
pCi/g	picoCuries per gram
PID	photoionization detector
ppm	parts per million
PSP	Project Specific Plan
QA	Quality Assurance
RI/FS	Remedial Investigation/Feasibility Study
RWP	Radiological Work Permit
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SDFP	Soil and Disposal Facility Project
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
TAL	Target Analyte List
V/FCN	Variance/Field Change Notice
VOC	volatile organic compound
WAC	waste acceptance criteria
WAO	Waste Acceptance Organization

1.0 INTRODUCTION

1.1 BACKGROUND

Former production operations at the Fernald Environmental Management Project (FEMP) resulted in widespread soil contamination within the Former Production Area, as well as other parts of the site. For the purpose of conducting soil remediation, the FEMP was divided into manageable remediation areas. Remediation Areas 3B/4B span the western half of the Production Area, bordered generally by the Haul Road to the north, "B" Street to the East, the Laboratory Building (Building 53) and the Production Area exclusion fence to the south, and the Production Area exclusion fence to the west. Area 5 generally covers the "Administrative Area" of the site. Refer to Figure 1-1 for a map identifying these soil remediation areas. The predominant structures located or formerly located in soil remediation Areas 3B/4B include Plants 1, 2, 3, 8, the Pilot Plant, and the Laboratory Building. The predominant structures located or formerly located within Area 5 include the Services Building, the Health and Safety Building, the Administrative Building, and the Security Building.

During the FEMP's Remedial Investigation/Feasibility Study (RI/FS), extensive soil sampling was conducted within what is now known as Areas 3B/4B/5, as well as other parts of the site, to define the nature and extent of soil contamination at the site. As part of the scoping process for development of this Project Specific Plan (PSP), a search of the Sitewide Environmental Database (SED) was performed to identify known exceedances of the On-Site Disposal Facility (OSDF) waste acceptance criteria (WAC) in Areas 3B/4B/5. This search identified a total of 18 borings with sample results that exceeded the OSDF WAC. However, two of these borings were investigated under the scope of separate PSPs (see Section 1.3). Of the other 16 borings, nine showed exceedances of the total uranium WAC [1,030 milligrams per kilogram (mg/kg)], five showed exceedances of the technetium-99 WAC [29.1 picoCuries per gram (pCi/g)], and two more showed exceedances of both the total uranium and technetium-99 WAC. Refer to Figure 1-2 for the locations of these borings, and Appendix A for all data collected from the borings. More information on the WAC exceedances is provided in Section 2.0.

While extensive sampling was conducted during the RI/FS, this was not the case in the immediate vicinity of the sanitary sewer line (Areas 4B and 5) due to complications with performing borings near active utilities. Because technetium-99 concentrations above WAC were found at the old Sewage Treatment Plant, additional technetium-99 contamination may be present in the vicinity of the sanitary sewer line. Since the utilities are now isolated in this area, it is prudent investigate soil in close proximity of the sanitary sewer line for technetium-99 concentrations exceeding the WAC.

1.2 PURPOSE

This PSP has been developed to delineate areas where constituent of concern (COC) concentrations in soil are known to exceed the WAC, in fulfillment of the requirement identified in Section 2.1.2 of the Sitewide Excavation Plan (SEP). Borings will also be conducted to determine if above-WAC soil is present in the vicinity of the sanitary sewer line. The purpose of sampling conducted under this PSP is to investigate and bound soil contaminated above the WAC, both horizontally and at depth. To bound the above-WAC soil as tightly as possible and minimize volume of soil requiring off-site disposition, the Variance/Field Change Notice (V/FCN) process will be used to add additional borings to the scope of this investigation based on the finding of previous boring sample analysis. This data collected under this PSP will be used in the remedial design for Areas 3B/4B/5.

1.3 SCOPE

The scope of this PSP is limited to the known WAC exceedances in Areas 3B/4B/5, with the exception of two exceedances that were investigated under separate PSPs. Boring Zone 1-273, on the north end of the Plant 1 Pad, was covered in the PSP for Sampling Miscellaneous Areas for WAC Attainment, while boring 1258, near the Pilot Plant, was investigated in the PSP for Area 4B Potentially Characteristic Area and West of Pilot Plant Predesign Investigation. Additional borings will be performed under this PSP in the vicinity of the sanitary sewer line to investigate potential technetium-99 WAC contamination. Finally, a separate PSP was originally planned for a final remediation level (FRL) attainment investigation in Area 3B/4B, however, very little additional FRL sampling is required, therefore, this data will also be collected under this PSP.

The known WAC exceedances in Areas 3B/4B/5 under the scope of this PSP are limited to 16 RI/FS boring locations and two COCs, total uranium and technetium-99. The 16 borings can be grouped into six general areas in the vicinity of: the Plant 1 Pad, Plant 2, Plant 8, the Pilot Plant, the Laboratory Building, and the Health and Safety Building. Note that the WAC exceedances have been grouped in this way for organizational purposes only, and except for the borings on the southwest corner of the laboratory building, there is no apparent relationship or contiguity among them. Note that neither the additional technetium-99 borings in the vicinity of the sanitary sewer line nor the FRL-attainment borings will be grouped in this manner since they are located across a larger area.

Sampling activities carried out under this PSP will be performed in accordance with the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ), the SEP, the WAC Attainment Plan for the OSDF, and Data Quality Objective (DQO) SL-048, Revision 5 (see Appendix B).

1.4 KEY PROJECT PERSONNEL

The key project personnel are listed in Table 1-1.

TABLE 1-1
KEY PERSONNEL

Title	Primary	Alternate
DOE Contact	Robert Janke	Kathi Nickel
SDFP Management	Jyh-Dong Chiou	Tom Beasley
Characterization Manager	Frank Miller	Eric Kroger
Field Sampling Lead	Tom Buhrlage	Jim Hey
Surveying Manager	Jim Schwing	Andy Clinton
WAO Contact	Linda Barlow	Christa Walls
Laboratory Contact	Denise Arico	Justin Burke
Data Management Lead	Eric Kroger	Ana Madani
Field Data Validation Contact	Andy Sandfoss	Jim Chambers
Data Validation Contact	Jim Chambers	Hobert Jones
FACTS/SED Database Contact	Cara Sue Schaefer	Susan Marsh
Quality Assurance Contact	Reinhard Friske	Mike Godber
Health and Safety Contact	Gregg Johnson	Jeff Middaugh/ Pete Bolig

FACTS – Fernald Analytical Computerized Tracking System
SDFP – Soil and Disposal Facility Project
WAO – Waste Acceptance Organization

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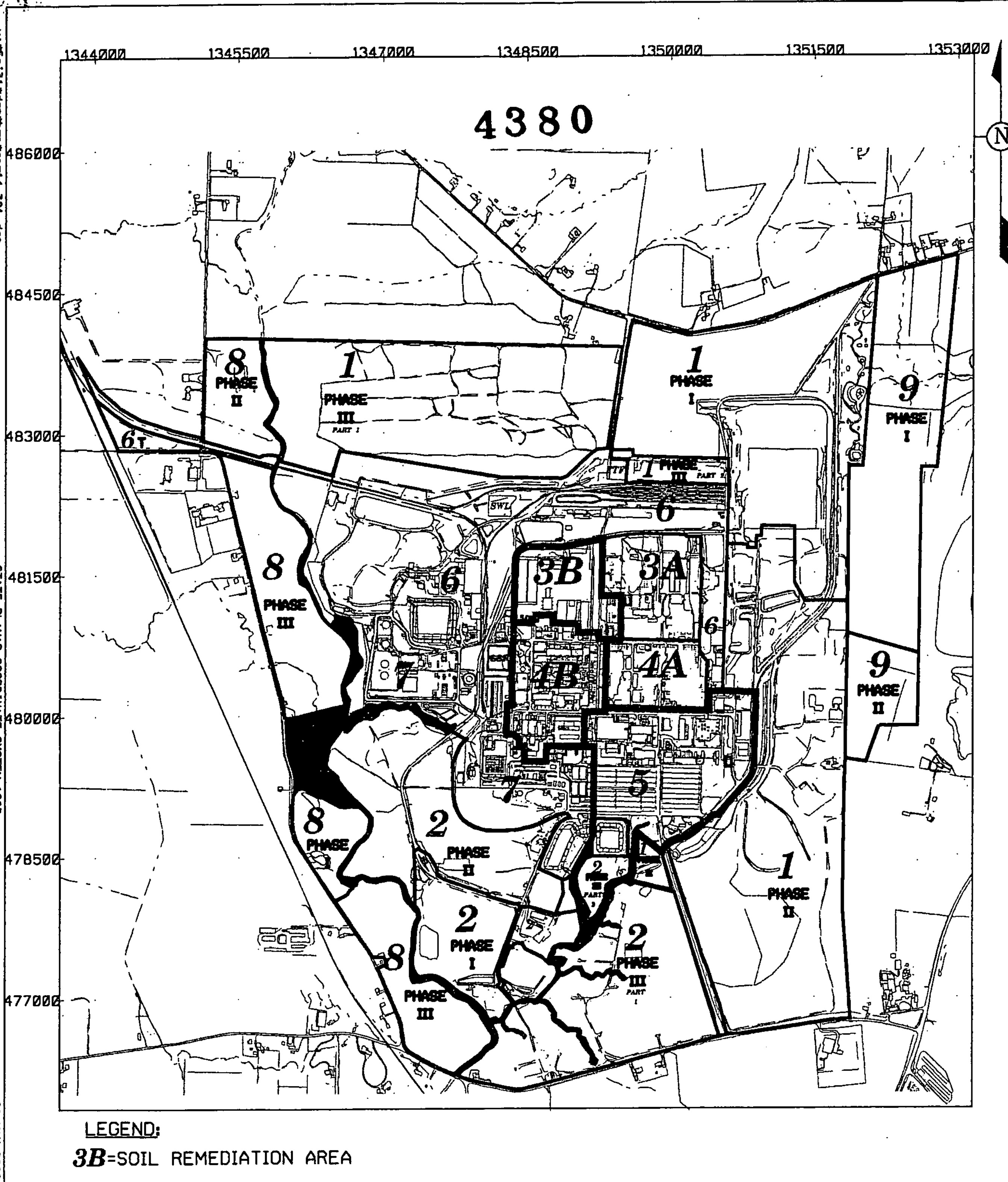

LEGEND:

3B=SOIL REMEDIATION AREA

SCALE

1500 750 0 1500 FEET

FIGURE 1-1. SOIL REMEDIATION AREAS 3B/4B/5

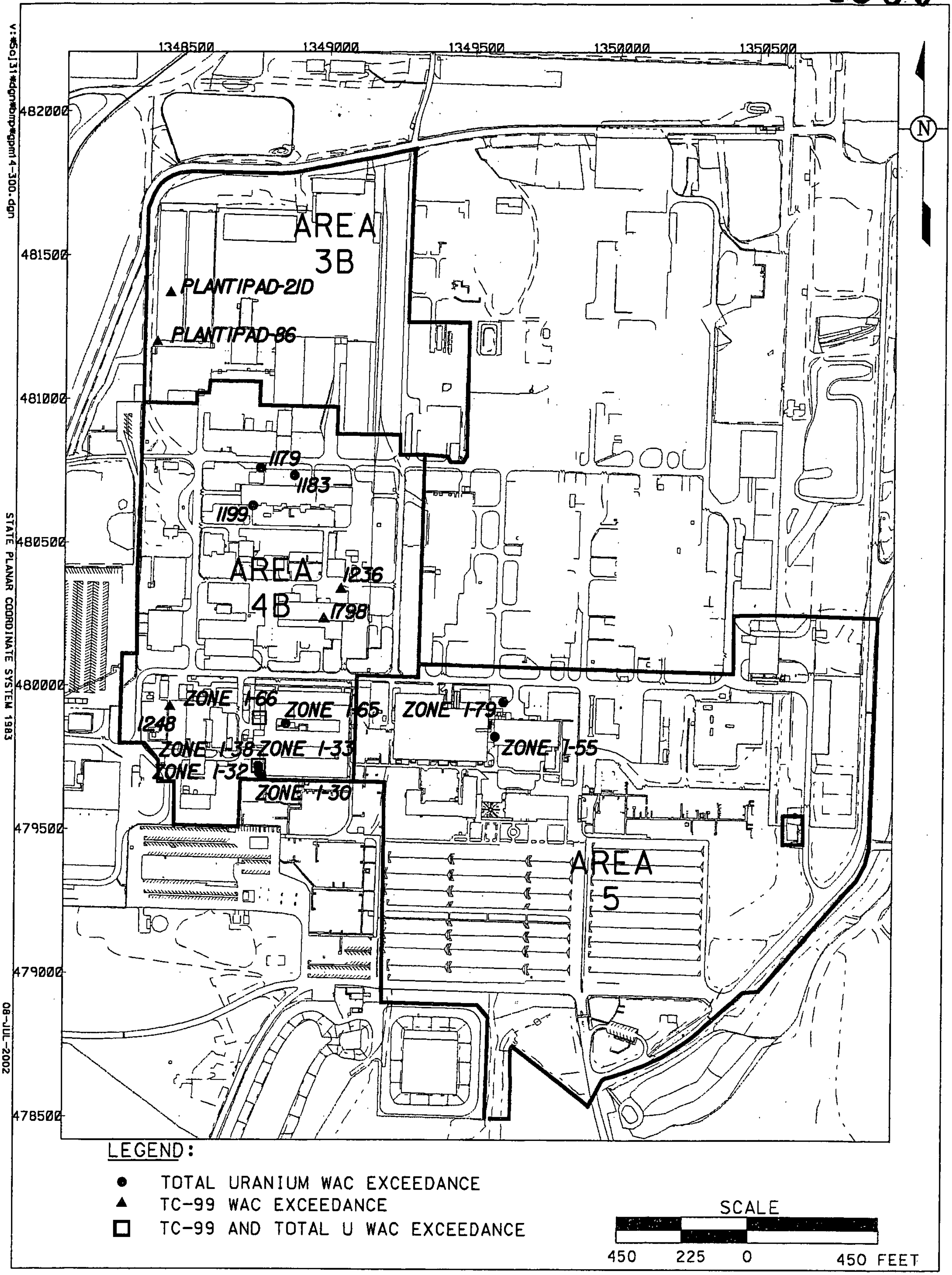

FIGURE 1-2. KNOWN WAC EXCEEDANCES IN AREAS 3B/4B/5 UNDER THE SCOPE OF THIS PSP

2.0 PHYSICAL SAMPLING STRATEGY

2.1 SAMPLING STRATEGY

The sampling strategy included in this PSP has been established to meet the objectives presented in Section 1.2, and is consistent with the SEP. The general strategy for delineating above-WAC areas under this PSP is as follows:

- Boring Locations: A confirmatory boring will be located near (within 1 foot of, but not at the exact location as) the original above-WAC boring, and a ring of borings will be located 5 feet in radius from the original boring in each of the four cardinal directions. This will be referred to as the "*5-foot pattern*". When the original WAC exceedance was higher than three-times the WAC, a second ring of borings was located 15 feet in radius from the original. This will be referred to at the "*5-foot, 15-foot pattern*". Adjustments will be made to boring locations to account for factors such as structures, utilities, drainage, and existing data.

- Sampling Depth: Samples will be collected from the same depth where the original WAC exceedance was identified, 1 foot below the exceedance, and 3 feet below the exceedance. When the original RI/FS boring is not bound at depth, or when the WAC exceedance includes technetium-99, an additional sample will be collected 6 feet below the original exceedance (due to the mobility of technetium-99). Of note, if there was more than one exceedance at an original above-WAC boring, the samples will be collected at and below the deepest above-WAC interval, at the depths identified above.

- Target Analytes: Total uranium and technetium-99 will be analyzed in all samples collected under this investigation, regardless of which COC has known WAC exceedances. .

- Photoionization Detector (PID) Survey: A PID survey will be performed on all soil cores collected in the vicinity of Plant 2, Plant 8, and the Pilot Plant, as discussed in Section 2.2.

- Beta/Gamma Scan: All soil cores collected under this PSP will be scanned with a beta/gamma (Geiger-Mueller) survey meter, as discussed in Section 2.2.

- Additional Borings: Should additional borings be required to bound the above-WAC soil, this will be done through the V/FCN process.

In some instances the nature of the contamination and/or location-specific conditions will warrant deviation from this general strategy (e.g., the southwest corner of the Laboratory Building and the vicinity of the sanitary sewer line). Detailed information on the known WAC exceedances in

Areas 3B/4B/5, as well as the logic for the location-specific sampling strategy (including additional technetium-99 sampling and FRL attainment sampling), is provided in the following subsections.

2.1.1 Plant 1 Pad Area

Two WAC exceedances were identified in the vicinity of the Plant 1 Pad, both for technetium-99 (118.2 pCi/g at location PLANT1PAD-21D; 53.7 pCi/g at location PLANT1PAD-86), and both at the surface (0 to 0.5 feet). Neither exceedance is bound at depth, meaning that the borings do not include deeper sample intervals with results below the WAC. As described in the Plant 1 Pad Continuing Release Removal Action Work Plan, these samples were collected following Removal Action 17 from what was formerly a "grassy area" west of the Pad to confirm that residual total uranium concentrations were below 35 pCi/g. Once this was confirmed, concrete was poured over top of this area to extend the Plant 1 Pad to the west, and Tension Support Structures 4 and 5 were erected on the new concrete. Because the two technetium-99 WAC exceedances were identified during the post-excavation sampling, both results are from soil that now lies beneath approximately 12 inches of concrete. Of note, there were several other RI/FS samples collected in close proximity to these borings, however, none of these samples included technetium-99 analyses.

Under this PSP, the 5-foot pattern of borings will be collected around borings PLANT1PAD-86 (see Figure 2-1). The 5-foot, 15-foot pattern of borings will be collected around PLANT1PAD-21D, since the technetium-99 result is over three-times the WAC (118.2 pCi/g). All 14 borings will be conducted to a depth of 6.5 feet, with sample intervals collected at the 0 to 0.5-foot, 1 to 1.5-foot, 3 to 3.5-foot, and 6 to 6.5-foot intervals below the overlying concrete. For each sample, the necessary volume (at a minimum) will be divided among two containers (see Table 2-1), one for total uranium analysis [Target Analyte List (TAL) B]; and the other for technetium-99 analysis (TAL D). Samples identified for total uranium analysis (on site) should be kept on a separate chain of custody form from those identified for technetium-99 analysis (off site). This will be the case for all samples collected under this PSP.

2.1.2 Plant 2 Area

Three RI/FS borings in the vicinity of Plant 2 showed one exceedance of the total uranium WAC. Boring 1179 had a total uranium concentration of 1,916 mg/kg at 1 to 1.5 feet, and is bound (285 mg/kg) at 4.5 to 5 feet, the next interval analyzed. Boring 1183 had a total uranium concentration of 5,310 mg/kg at 0 to 0.5 feet, with the 0.5 to 1-foot sample showing concentrations well below WAC

(227 mg/kg). Finally, boring 1199 had a total uranium concentration of 5,685 mg/kg at 0 to 0.5 feet, and is bound (333 mg/kg) at 2 to 2.5 feet, the next interval collected.

Under this PSP, borings will be collected in the 5-foot pattern around location 1179 to a depth of 4.5 feet (see Figure 2-2). Sample intervals will be collected at 0 to 0.5-foot, 1 to 1.5-foot, 2 to 2.5-foot, and 4 to 4.5-foot depths below overlying material (concrete, asphalt, gravel). The 5-foot, 15-foot pattern of borings will be collected around locations 1183 and 1199. All borings around 1183 and 1199 will be to a depth of 3.5 feet, with samples collected at the 0 to 0.5-foot, 1 to 1.5-foot and 3 to 3.5-foot depths below overlying material. For each sample, the necessary volume (at a minimum) will be divided among two containers (see Table 2-1), one for total uranium analysis (TAL B); and the other for technetium-99 analysis (TAL D). All soil cores will also undergo a PID screen, per Section 2.2. Of note, boring A4B-P2-23 (which is located 15 feet north of 1199 and inside of Plant 2) will not be collected if A4B-P2-16 results indicate below-WAC contamination.

2.1.3 Plant 8 Area

Two RI/FS borings located in the vicinity of Plant 8 identified soil exceeding the OSDF WAC for technetium-99. Boring 1236 contained a technetium-99 concentration of 205 pCi/g at 6 to 6.5 feet, and is not bound at depth. Of note, there were two shallower samples (0 to 0.5 feet and 3 to 3.5 feet) with results well below the WAC (3.31 and 1.44 pCi/g, respectively), thus providing upward bounding. Boring 1798 had a technetium-99 concentration of 37.4 pCi/g at 0 to 0.5 feet, and is not bound at depth. While there were two RI/FS borings in close proximity to 1798, neither included any technetium-99 analyses.

This PSP will include the collection of borings in the 5-foot, 15-foot pattern at RI/FS boring 1236 (Figure 2-3). These nine borings will be conducted to a depth of 15 feet, with samples collected from the 6 to 6.5 feet, 7 to 7.5 feet, 9 to 9.5 feet, and 12 to 12.5 feet below any overlying material present. To provide additional assurance that this sampling program bounds the contamination at depth, a final sample will be collected at 14.5 to 15 feet. To bound boring 1798, the 5-foot pattern of borings will be collected here, as well. These five borings will be conducted to a depth of 6.5 feet, with samples collected at 0 to 0.5 feet, 3 to 3.5 feet, and 6 to 6.5 feet below the concrete floor. For each sample, the necessary volume (at a minimum) will be divided among two containers (see Table 2-1), one for total

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uranium analysis (TAL B); and the other for technetium-99 analysis (TAL D). All soil cores will also undergo a PID screen, per Section 2.2.

2.1.4 Pilot Plant Area

Only one WAC exceedance in the vicinity of the Pilot Plant falls under the scope of this PSP. A technetium result of 55.3 pCi/g was identified in boring 1248, beneath the Pilot Plant floor, at a depth of 1 to 1.5 feet. The next interval (1.5 to 2 feet) bounded this exceedance with a result of 1.5 pCi/g. This PSP will include the collection of borings in the 5-foot pattern at RI/FS boring 1248 (see Figure 2-4). The boring 5 feet to the west will be collected as closely as possible to the west wall of the Pilot Plant. All borings will be conducted to a depth of 7.5 feet below the concrete floor of the building. Samples will be collected from the 0 to 0.5-foot, 1 to 1.5-foot, 2 to 2.5-foot, 4 to 4.5-foot and 7 to 7.5-foot intervals below the floor. For each sample, the necessary volume (at a minimum) will be divided among two containers (see Table 2-1), one for total uranium analysis (TAL B); and the other for technetium-99 analysis (TAL D). All soil cores will also undergo a PID screen, per Section 2.2.

2.1.5 Laboratory Building Area

Data from six RI/FS borings showed total uranium concentrations above the WAC, and two of these borings also showed technetium-99 concentrations exceeding the WAC (Figure 2-5).

- Zone 1-65, located near the sump in the north court yard of the laboratory building, showed a total uranium result of 1,239 mg/kg at 0 to 0.5 feet, and is bound (328 mg/kg) at 0.5 to 1 feet.

- Zone 1-66, located just west of the Laboratory Building near the loading dock, had sample results exceeding the total uranium and technetium-99 WAC (total uranium = 7,013 mg/kg at 0 to 0.5 feet; 1,235 mg/kg at 0.5 to 1 feet; technetium-99 = 35 pCi/g at 0 to 0.5 feet). The WAC exceedances of both COC's are bound at depth (total uranium = 379 mg/kg at 1 to 1.5 feet; technetium-99 = 10.2 pCi/g at 0.5 to 1 feet).

- Borings Zone 1-30, Zone 1-32, Zone 1-33, and Zone 1-38 appear to be part of a contiguous above-WAC area at the southwest corner of the Laboratory Building. All borings include unbound total uranium WAC exceedances, ranging from 1,184 to 43,064 mg/kg; Zone 1-38 also includes a technetium-99 result of 320 pCi/g at 0 to 0.5 feet, which is bound with a result of 1 pCi/g at 0.5 to 1 feet.

Under this PSP, the 5-foot pattern of borings will be collected around RI/FS boring Zone 1-65 to a depth of 3.5 feet below any overlying material present. Samples will be collected from the 0 to 0.5-foot, 1 to 1.5-foot, and 3 to 3.5-foot intervals below overlying material.

The 5-foot pattern of borings will also be collected around RI/FS boring Zone 1-66 to a depth of 4 feet below overlying material present. The 0 to 0.5-foot, 1 to 1.5-foot, and 3.5 to 4-foot intervals beneath overlying material will be collected. While the soil concentrations at Zone 1-66 exceed three-times the WAC, collecting the four borings 15 feet to the north and east would be logistically difficult since these borings would be inside of the Laboratory Building. Zone 1-66 is already bounded to the west at approximately 15 feet by RI/FS boring 1262 (results are well below the WAC for both total uranium and technetium-99). Therefore, the only 15-foot boring will be A4B-LAB-18, to the south. If above-WAC results are identified in the initial 5-foot perimeter borings, a decision will be made at the time as how to best proceed. Also, seven biased borings have been located around the estimated perimeter of the contiguous WAC area near the Laboratory Building loading dock. All of these borings will be conducted to a depth of 10.5 feet due to the notably high total uranium concentrations, the presence of technetium-99 above WAC, and the fact that the majority of the above-WAC samples are not bound at depth. Samples will be collected from the 0 to 0.5-foot, 1.5 to 2-foot, 4 to 4.5-foot, 7 to 7.5-foot, and 10 to 10.5-foot intervals below any overlying material present. This sampling approach is being used to bound this contiguous area since it is considered a single source of above-WAC contamination. For all of the above samples, the necessary volume (at a minimum) will be divided among two containers (see Table 2-1), one for total uranium analysis (TAL B); and the other for technetium-99 analysis (TAL D).

2.1.6 Health and Safety Building Area

Within Soil Remediation Area 5, three WAC exceedances (all total uranium) were identified from two borings, both in the vicinity of the Health and Safety Building (Figure 2-6). Borings Zone 1-55 showed a result of 2,680 mg/kg at 0 to 0.5 feet and is unbound at depth; while Zone 1-79 showed results of 3,150 and 1,660 mg/kg at 0 to 0.5 feet and 0.5 to 1 feet, respectively. It is bound with a concentration of 402 mg/kg at a depth of 1 to 1.5 feet. The soil where both of these exceedances were identified was subsequently removed in 1989 during construction of the addition to the Health and Safety Building (see Figure 2-6). To verify that remaining soil at these locations is below the WAC, one boring will be collected as closely as possible to each location to a depth of 6.5 feet below concrete or any other overlying material present. Samples will be collected from the 0 to 0.5-foot, 3 to 3.5-foot, and 6 to 6.5-foot intervals. For each sample, the necessary volume (at a minimum) will be divided among two containers (see Table 2-1) one for total uranium analysis (TAL B); and the other for technetium-99 analysis (TAL D). These samples will not be collected until decontamination and dismantlement of the Health and Safety Building is complete, due to their close proximity to the building.

2.1.7 Additional Technetium-99 Analyses in the Vicinity of the Sanitary Sewer Line

To investigate potential WAC exceedances for technetium-99 in the vicinity of the sanitary sewer line, 10 additional borings, as shown on Figure 2-7, will be performed in close proximity to the line. Based on the Utility Engineers' drawings, the sanitary lines are approximately 6 feet below the ground surface. Therefore, the borings will be performed to 7 feet below surface, and two samples will be collected from each boring: the 0 to 0.5-foot and 6.5 to 7-foot depth intervals below surface. These samples will be analyzed for technetium-99 (TAL D). Additionally, process knowledge and conversations with the Utility Engineers indicate that volatile organic contamination is possible in the vicinity of the laundry sump where A5-AT-9 is located. Therefore, the two samples collected from boring A5-AT-9 should also be analyzed for total volatile organics (TAL G). The necessary volume of soil (at a minimum) for these analysis should be placed into two separate containers. Also, one trip blank will need to be collected for each day where samples are collected for VOC analysis.

2.1.8 Area 4B FRL Attainment Sampling

Based on the historical data present in Areas 3B/4B, a 3-D model was developed to identify the extent of remedial excavations necessary to remove total uranium contamination in this part of the site. Since this model will account for all total uranium FRL exceedances, only non-uranium FRL exceedances will need to be considered to determine if additional soil needs to be removed. To make this determination, all borings with non-uranium FRL exceedances were plotted with the modeled total uranium excavation (50 mg/kg; 20 mg/kg in the high leachability zone). This exercise revealed that only two non-uranium FRL exceedances in 3B/4B lie outside of the total uranium excavation footprint: borings 11095 and 11101. Boring 11095 (located just south of Plant 2) showed exceedances of the beryllium FRL at 0 to 0.5-foot, 1 to 1.5-foot, 3 to 3.5-foot, 6 to 6.5-foot and 9 to 9.5-foot intervals. Boring 11101 (located north of Plant 2 and just north of 2nd Street) showed exceedances of the beryllium FRL at 0 to 0.5-foot, 1 to 1.5-foot, 3 to 3.5-foot, and 9 to 9.5-foot, 12 to 13-foot and 15 to 16-foot intervals; plus an exceedance of the arsenic FRL at 6 to 6.5 feet.

At boring 11095 the modeled total uranium plume extends to within about 50 feet southwest of this location, and is several feet more shallow than the deepest known beryllium contamination (9 to 9.5 feet). To investigate the beryllium concentrations, two additional borings will be located in the vicinity of 11095. A confirmatory boring will be located within a foot of the original location and an additional boring will be located approximately 5 feet to the northeast of 11095 (see Figure 2-8).

Samples will be collected from the 0 to 0.5-foot, 10 to 10.5-foot and 12 to 12.5-foot intervals below surface. The samples will be analyzed for TALs D (technetium-99) and E (beryllium; see attached). Technetium-99 is being analyzed to add to the technetium-99 data set for Areas 3B/4B.

At boring 11101, the modeled total uranium plume extends to within about 40 feet southwest feet of this location. A confirmatory boring will be located within a foot of the original location, and an additional boring will be located approximately 5 feet to the northeast of 11101 (see Figure 2-9). Two samples will be collected from the 0 to 0.5-foot, 6 to 6.5-foot, 16.5 to 17-foot, and 18.5 to 19-foot intervals of both borings, and placed in two separate glass or polyethylene containers. Samples will be analyzed for TALs D and F (beryllium and arsenic). Again, technetium-99 is being analyzed to add to the Area 3B/4B data set. Due to the analysis of two analytical suites (rads and metals), the sampling technician should place the sample material into two separate containers. Refer to Table 2-1 and Appendix C.

2.2 SAMPLE COLLECTION METHODS

Soil sampling will be conducted in accordance with procedure SMPL-01, Solids Sampling. Borings will be completed using the Geoprobe® Model 5400, or an alternate method identified in SMPL-01. While perched water may be encountered, there is no need to collect perched water samples. So the dual tube will not have to be used unless the macro-core is not sufficient for collection of the identified core. The method of sample collection will be left to the discretion of the field sampling lead. If refusal or resistance is encountered during sample collection, the location may be moved within a 3-foot radius of the identified sample location, unless precluded by the penetration permit. If the distance is greater than 3 feet from the originally planned sample point, the change must be documented on a V/FCN form, as described in Section 3.4.

When sampling below gravel, asphalt, or concrete, the uppermost sampling interval will begin where the soil contains less than 50 percent gravel. Because sample intervals are recorded in even 6-inch intervals and sample identification numbers include a depth designation that corresponds to each 6-inch interval, material overlying the uppermost sampling interval will be identified in 6-inch depth intervals. Any overlying material interval of less than 3 inches will be included as part of the previous interval. Any interval greater than 3 inches but less than 6 inches will be recorded as a separate interval and rounded to the next 6-inch interval measurement. For example, 8 inches of overlying material would be recorded as a single 6-inch interval, while 9 inches of overlying material would be recorded as two 6-inch intervals. Because the ultimate goal of this sampling effort is to define the excavation depth, the potential 3-inch discrepancy introduced by rounding the depth of overlying material will not be significant during excavation with heavy equipment.

Upon collection, sampling personnel will provide a physical description of the material, consisting of general color, material type, frisker/PID readings, and foreign material, at each 6-inch interval of each boring. If anomalous material is found in the boring, then the field sampling lead or the characterization lead will notify a geologist to further define the material's characteristics. Full lithological characterization by a geologist, including Munsell chart, grain size, moisture, plasticity, and density, will not be performed on every boring.

Soil cores collected in the vicinity of Plant 2, Plant 8, and the Pilot Plant will be scanned with a PID, according to procedure EQT-04. Any samples with scanning results that exceed 5 parts per million (ppm) above background will be collected and analyzed for pertinent volatile organic compounds (VOCs). This includes both Area 3B/4B/5 area-specific constituents of concern (ASCOCs) and WAC constituents, as identified in TAL C. If four or more consecutive 6-inch intervals exceed 5 ppm above background, the following samples will be submitted for analysis:

- The shallowest and deepest samples that exceeded 5 ppm above background, in order to bound the area
- The sample in between the two bounding samples with the highest concentration
- If the samples in between the two bounding intervals have the same result, randomly choose an interval or, if there is a change in material types, choose an interval of sandy soil instead of clay soil.

Note that the head-space analysis has been omitted because the initial PID screen has proven to be sufficiently reliable for identifying samples for analysis. This is a more conservative measure that will also save considerable time and effort in the field.

The entire length of all soil cores collected will also be surveyed with a beta/gamma (Geiger-Mueller) survey meter and results will be recorded as part of the field documentation. If the field screening results from the deepest sample interval identified for collection (Appendix C) exceed 450 corrected counts per minute (ccpm), it is considered potential above-WAC material, and another sample will be collected 3 feet below that interval. That sample will also be submitted for analysis for the same TAL as other samples from that boring. This process will be repeated until the deepest interval collected scans less than 450 ccpm.

Following PID and beta/gamma screening, sufficient volume of the appropriate sample intervals (see Section 2.1 or Appendix C) will be separated from each core and placed in the appropriate container(s). Sampling and analytical requirements are summarized in Table 2-1. If a 6-inch interval contains insufficient soil mass for the necessary analyses, additional material can be obtained by performing an additional push. All samples will be to the Sample Processing Laboratory. Samples identified for off-site analysis will be prepared for shipment to the contract laboratory.

Note that for off-site analyses, the Sampling Technicians must collect three times the soil volume for one sample per release so the contract laboratory can perform the required laboratory QC. The locations/samples where the additional volume is collected is left to the discretion of the field sampling lead.

2.3 SAMPLE IDENTIFICATION

All physical samples collected for laboratory analysis or archiving will be assigned a unique sample identifier, as listed in Appendix C. This identifier will consist of the following:

1. Area Designator: Identifies the remediation area where the sample is collected (Area 3B = A3B, Area 4B = A4B, Area 5 = A5).

2. Location Designator: Abbreviation to identify the general location of the boring, where: Plant 1 Pad area = P1P; Plant 2 area = P2; Plant 8 area = P8; Pilot Plant area = PP; Laboratory Building Area = LAB; and Health and Safety Building = HSB; AT = additional technetium-99 borings. FRL = FRL attainment borings. This will be followed by a sequential number (1, 2, 3, etc.).

3. Depth Interval Designator: Sequential letter (a, b, c, etc.) to denote the sample collected at varying depths beneath overlying material. This will be replaced with a number to designate the actual depth below surface once the depth of overlying material (if any) is known. This number will be equal to two-times the bottom depth of the interval below surface (refer to Appendix C).

4. Measurement Designator: R = Radionuclide analysis
M = Metals analysis
L = VOC analysis

5. Quality Control Designator: V = Archive (if necessary, but not specified in PSP)
D = Duplicate sample (if necessary, but not specified in PSP)
TB = Trip Blank.

For example, A4B-P2-12-c-R is the third interval collected from the surface, collected from the 12th boring location in the vicinity of Plant 2 in Area 4B, and the sample is intended for radionuclide analysis. If an archive sample is subsequently analyzed, the "V" will be replaced with the letter designation of the type of analysis. If a boring location requires multiple borings due to subsurface refusal, or if a boring is moved after attempting the original location, the boring identifier will be designated with an alphabetical suffix (e.g., A3B-P1P-4A, A3B-P1P-4B, etc.). Unless refusal is experienced in the first push of the Geoprobe®, samples collected from a boring prior to experiencing refusal will be kept, and sample collection will resume beyond the refusal depth at a subsequent successful boring.

2.4 EQUIPMENT DECONTAMINATION

Decontamination is performed on the sampling equipment to protect worker health and safety and to prevent the introduction of contaminants into subsequent soil samples. Sampling equipment will be decontaminated prior to transport to the field site, between sample locations, and after sampling performed under this PSP is completed. Equipment that comes into contact with sample material will be decontaminated at Level II (Section K.11, SCQ). Other equipment that does not contact sample media may be decontaminated at Level I, or wiped down using disposable towels. Clean disposable wipes may be used to replace air drying of the equipment.

2.5 WASTE DISPOSITION

Excess soil from the borings will be containerized for disposition or dispersed on the ground or gravel surface in the immediate area of the boring, based on direction from WAO. Any water (used decontamination water, excess perched groundwater, etc.) generated during sampling must be containerized and documented on a completed Wastewater Discharge Request Form (FS-F-4045) before disposal. Any non-soil solid waste generated from the sampling effort will be documented and disposed in accordance with applicable requirements for each boring location, as determined by WAO.

2.6 BOREHOLE ABANDONMENT

Each borehole will be plugged using bentonite pellets or a bentonite grout slurry immediately after sampling is completed, in accordance with DRL-01, Plugging and Abandonment. Any concrete or asphalt that is removed will be replaced with an equal thickness of cement. A Borehole Abandonment Log will be completed for each borehole.

TABLE 2-1
SAMPLING AND ANALYTICAL REQUIREMENTS

Analyte	Sample Matrix	Lab	ASL	Preservation	Holding Time	Container	Sample Volume/ Mass[a]
Total Uranium (TAL B)	Solid	On-site	B	None (soil)	12 months	glass or poly of appropriate size	20g[b]
Selected VOC (TAL C)	Solid or Water	Off-site	B	Cool 2°-6° C (water and soil) H_2SO_4, pH<2 (water)	14 days	60-mL glass with Teflon cap	10 mg (soil without rocks) 3 x 40-mL (Water) Fill to no headspace
Technetium-99 (TAL D)	Solid	Off-site	B	None (soil)	12 months	glass or poly of appropriate size	50g[b]
Beryllium (TAL E)	Solid	Off-site	B	None (soil)	12 months	glass or poly of appropriate size	50g[b]
Beryllium Arsenic (TAL F)	Solid	Off-site	B	None (soil)	12 months	glass or poly of appropriate size	50g[b]
Total VOC (TAL G)	Solid or Water (trip blanks)	Off-site	B	Cool 2°-6° C (water and soil) H_2SO_4, pH<2 (water)	14 days	Soil: 60-mL glass w/ Teflon cap Water: 3 x 40-mL glass w/ Teflon septa cap	10 mg (soil without rocks) 3 x 40-mL (Water) Fill to no headspace

ASL – analytical support level

[a] Triple the specified volume must be collected for one sample per release (see Section 2.2) in order for the contract laboratory to perform the required quality control analysis
[b] Sample must be containerized individually

000023

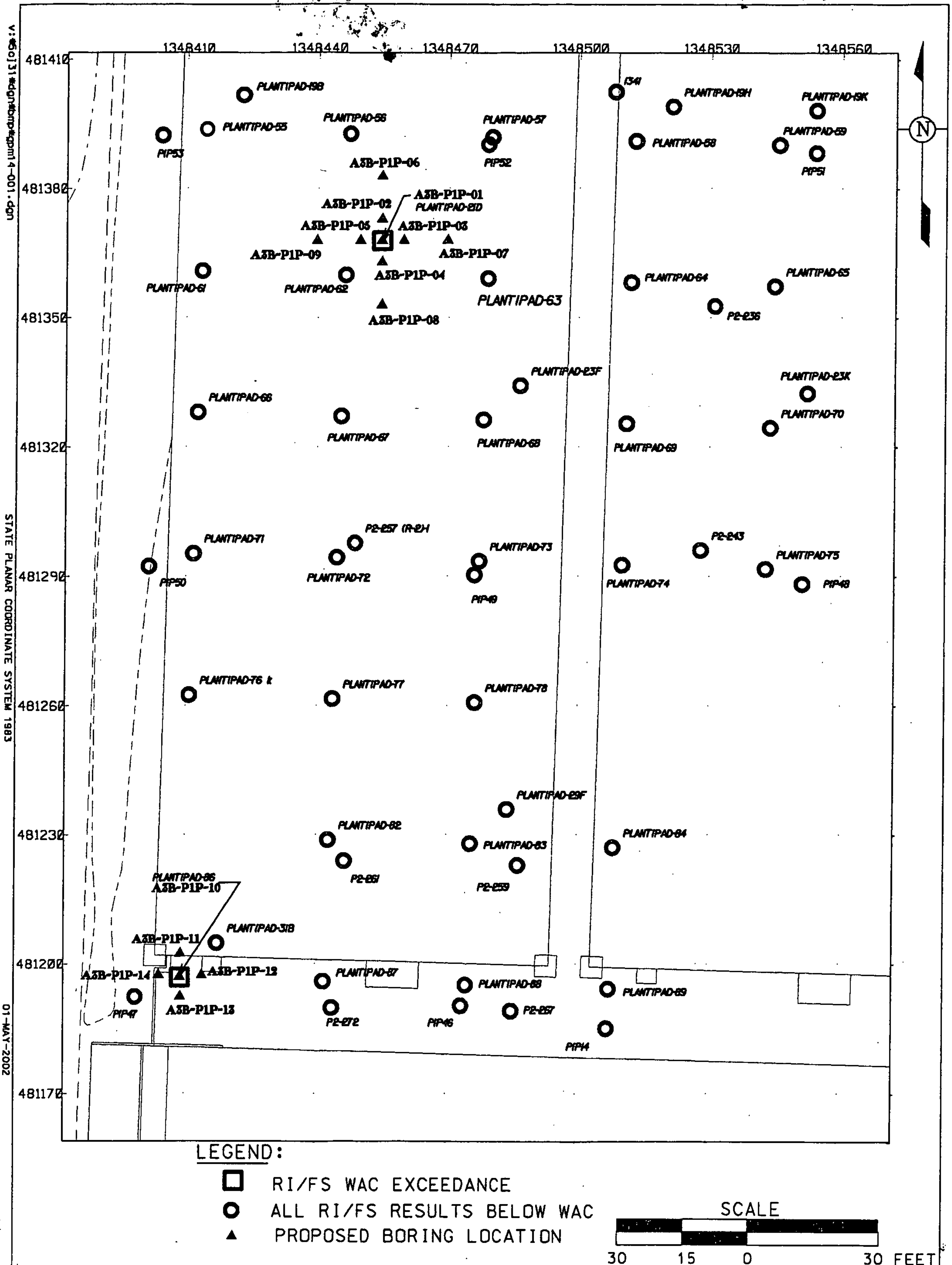


FIGURE 2-1. ABOVE-WAC LOCATIONS IN THE VICINITY OF THE PLANT 1 PAD AND PROPOSED BORING LOCATIONS

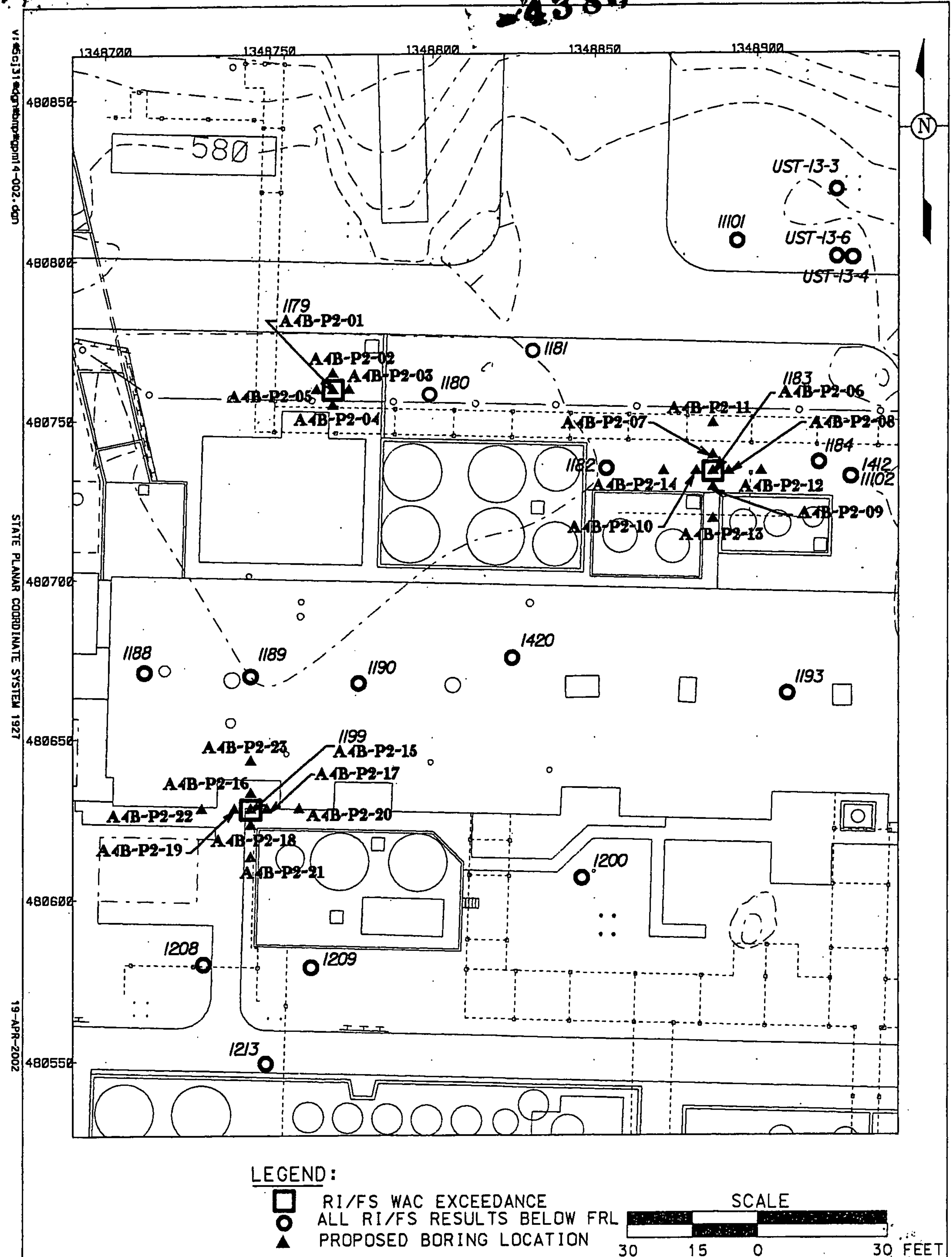
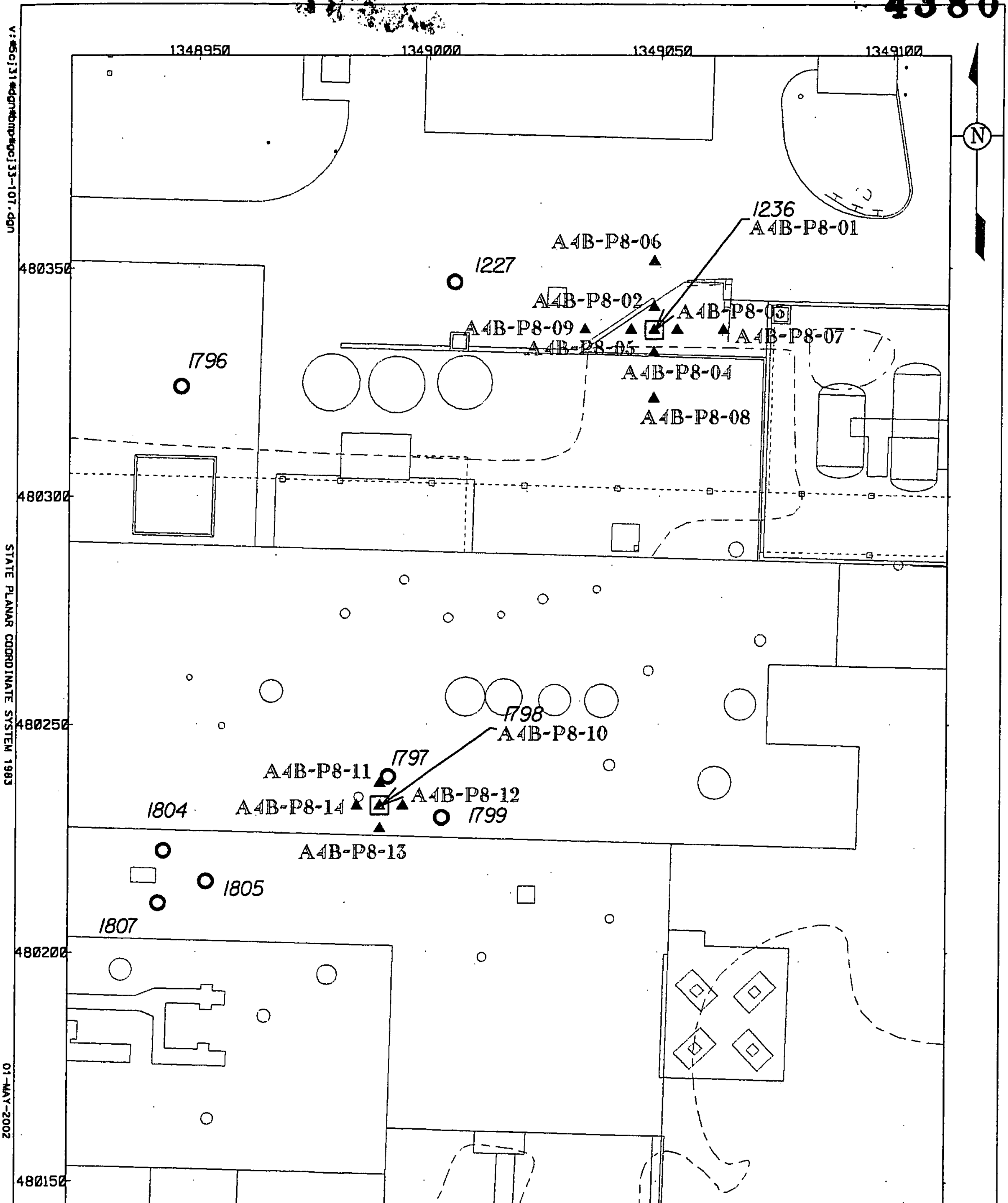


FIGURE 2-2. ABOVE-WAC LOCATIONS IN THE VICINITY OF PLANT 2 AND PROPOSED BORING LOCATIONS



LEGEND:

- ☐ RI/FS WAC EXCEEDANCE
- O ALL RI/FS RESULTS BELOW FRL
- ▲ PROPOSED BORING LOCATION

SCALE

30 15 0 30 FEET

FIGURE 2-3. ABOVE-WAC LOCATIONS IN THE VICINITY OF PLANT 8 AND PROPOSED BORING LOCATIONS

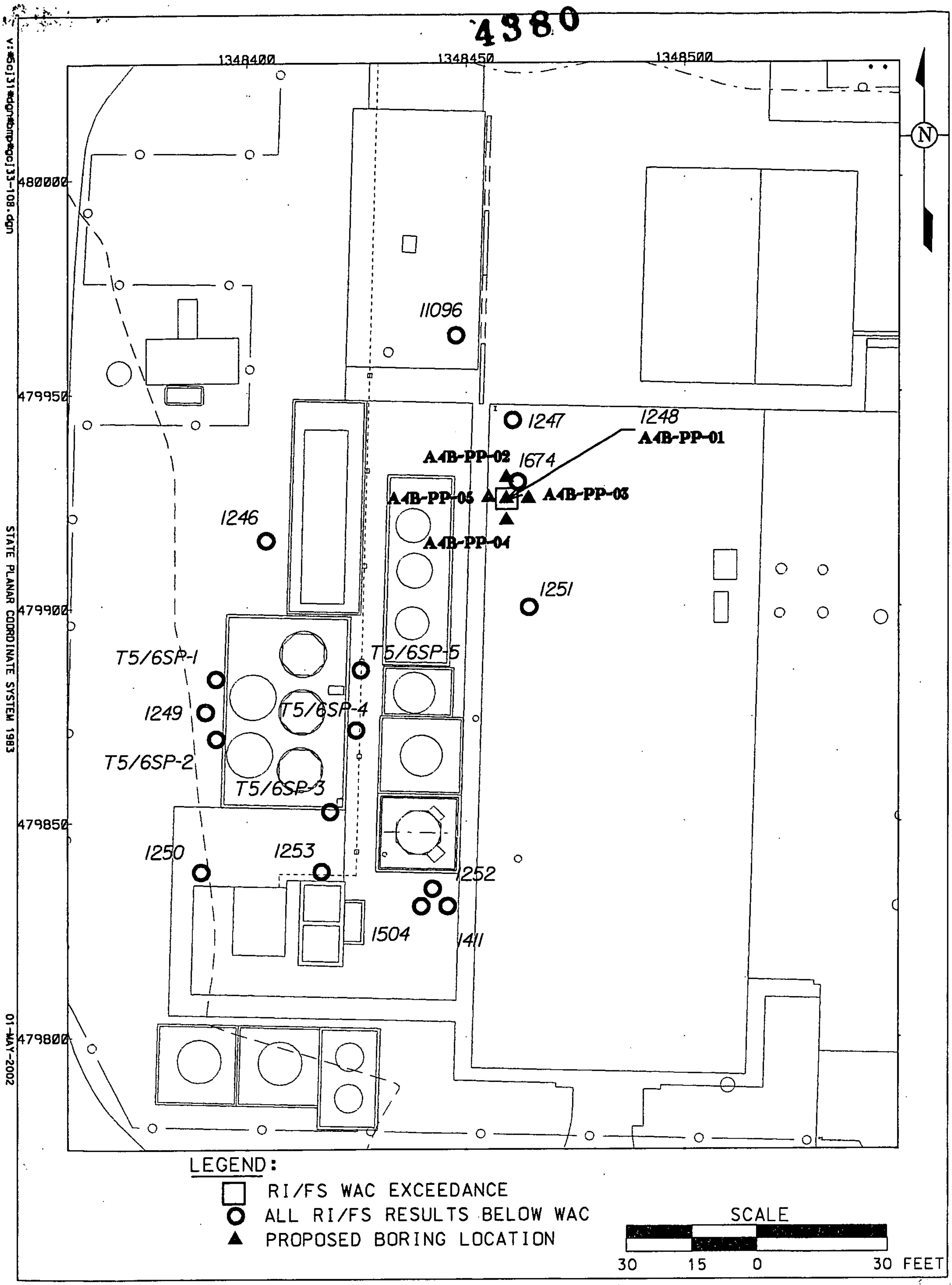


FIGURE 2-4. ABOVE-WAC LOCATION IN THE VICINITY OF THE PILOT PLANT AND PROPOSED BORING LOCATIONS

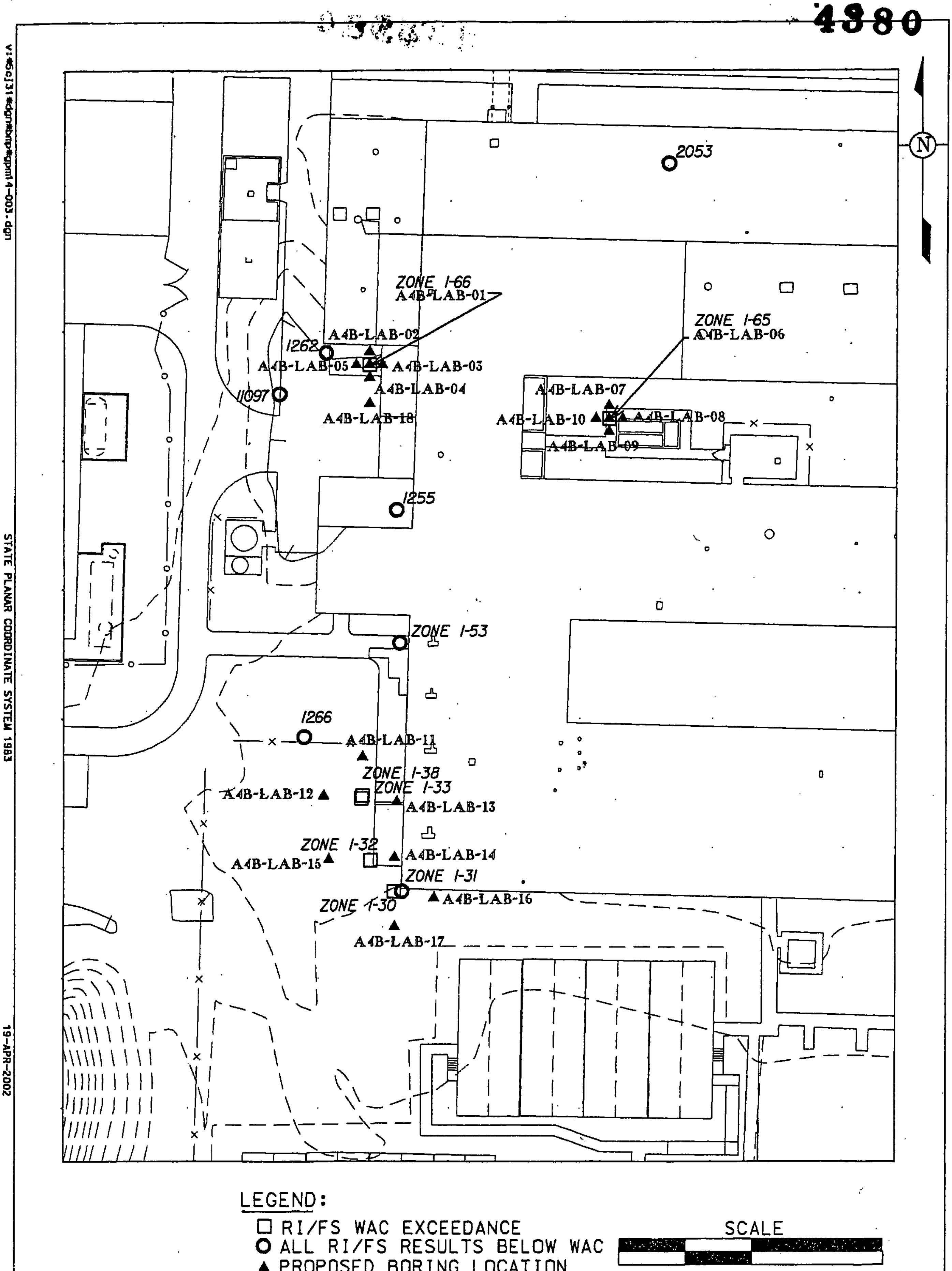


FIGURE 2-5. ABOVE-WAC LOCATIONS IN THE VICINITY OF THE LAB BUILDING AND PROPOSED BORING LOCATIONS

4380

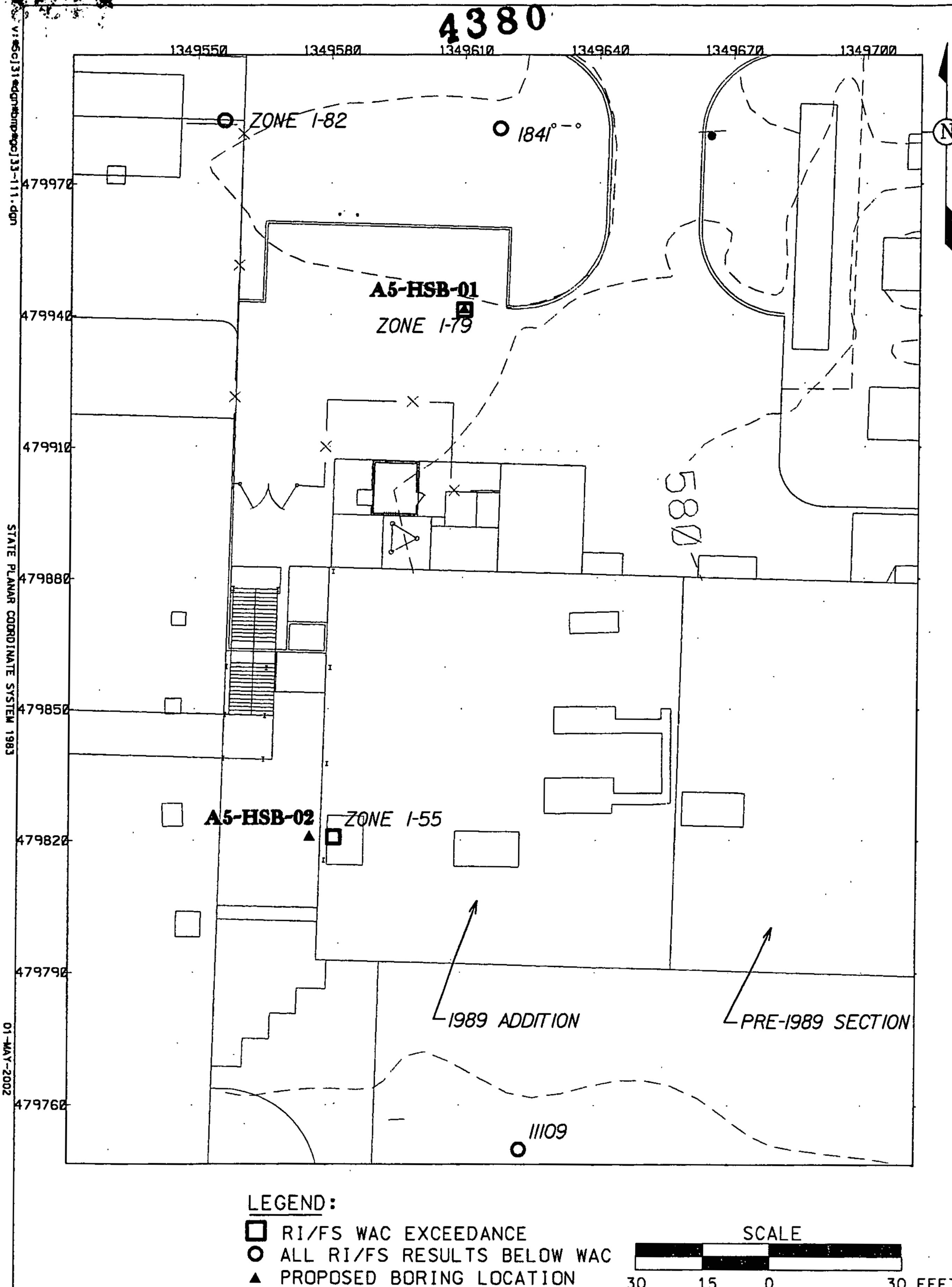
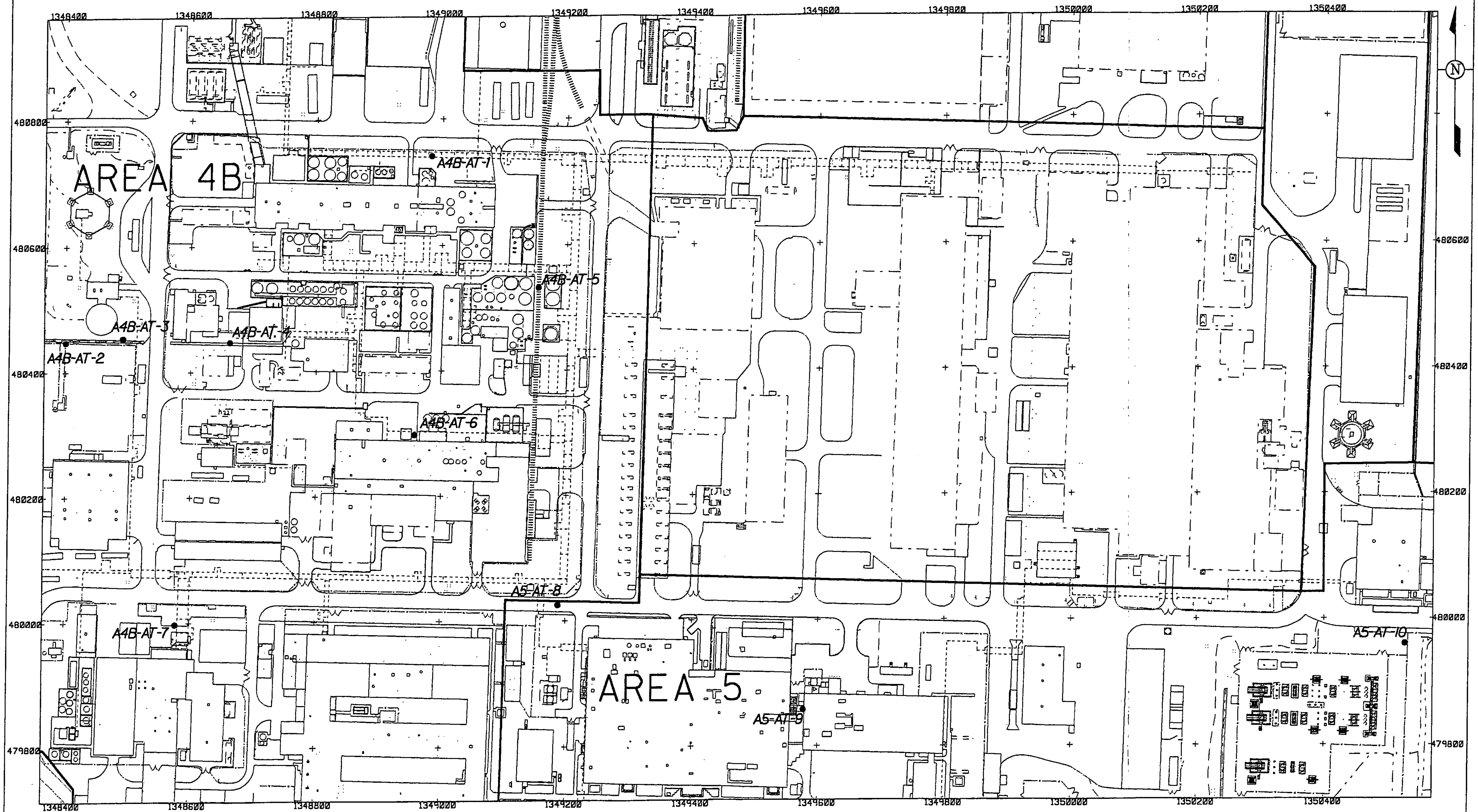


FIGURE 2-6. ABOVE-WAC LOCATIONS IN THE VICINITY OF THE HEALTH AND SAFETY BUILDING



LEGEND:

• NEW BORING LOCATION

SCALE

150 75 0 150 FEET

DRAFT

v:\2fm12\dgn\borings\4b_5_001.dgn STATE PLANAR COORDINATE SYSTEM 1983 08-JUL-2002

FIGURE 2-7. ADDITIONAL TECHNETIUM-99 SAMPLING LOCATIONS IN THE VICINITY OF THE SANITARY SEWER LINE

4380

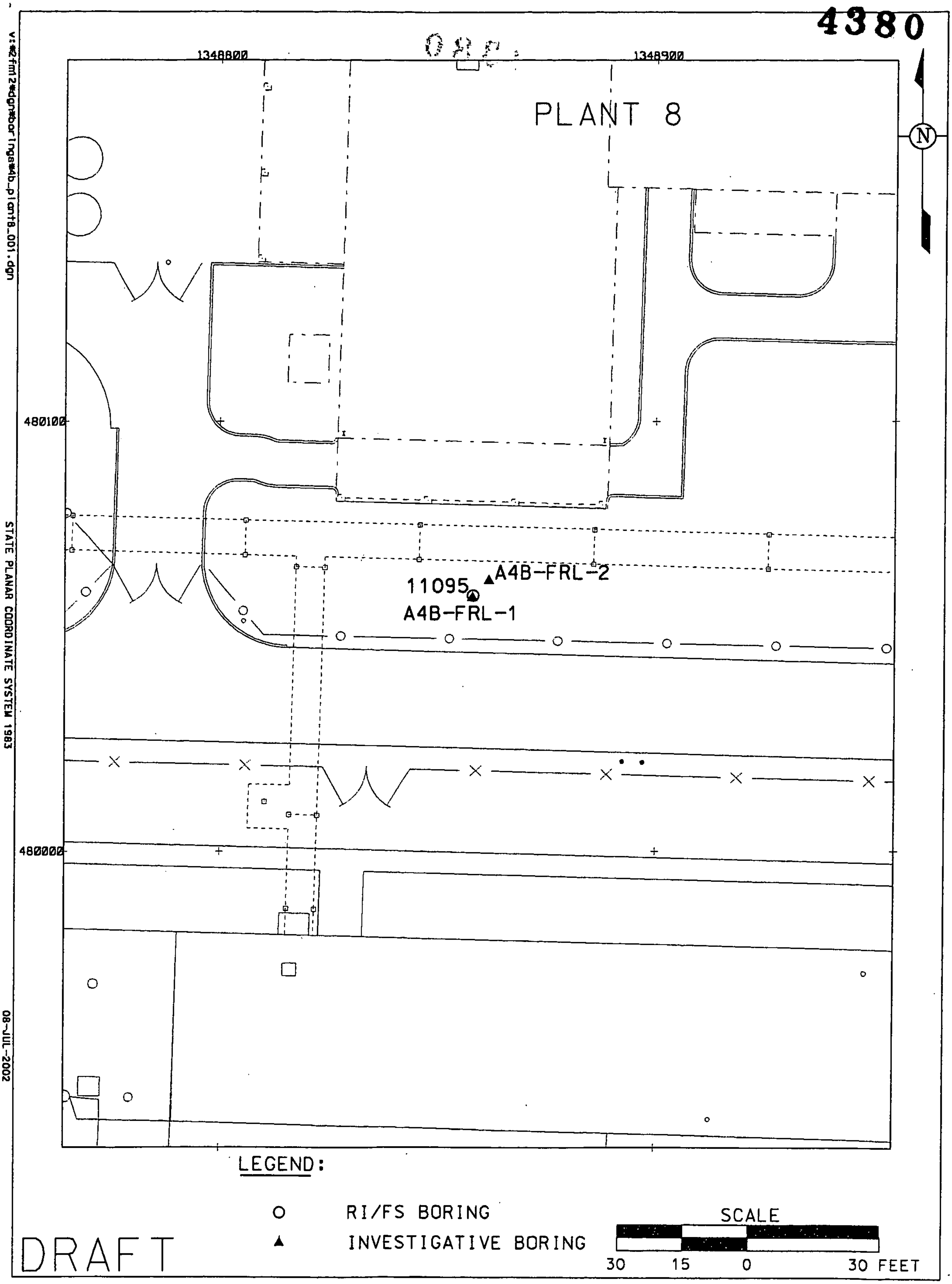


FIGURE 2-8. FRL-ATTAINMENT BORINGS IN A4B SOUTH OF PLANT 8

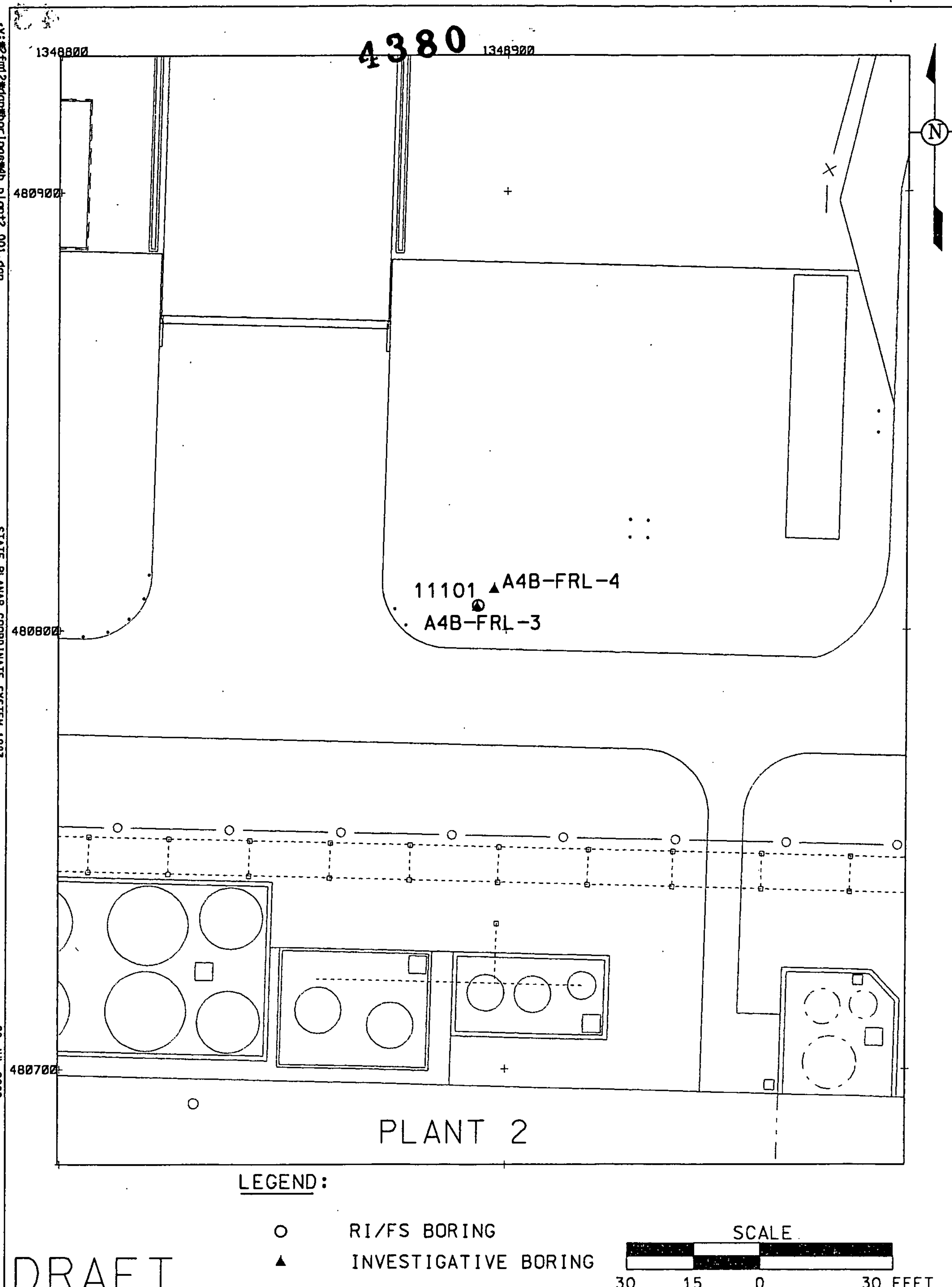


FIGURE 2-9. FRL-ATTAINMENT BORINGS IN A4B NORTH OF PLANT 2

3.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

3.1 FIELD QUALITY CONTROL SAMPLES, ANALYTICAL REQUIREMENTS AND DATA VALIDATION

In accordance with the requirements of DQO SL-048, Revision 5 (see Appendix B), the field quality control, analytical, and data validation requirements are as follows:

- All laboratory analyses will be performed at ASL B (ASLs are defined in the SCQ)
- Neither duplicates nor equipment rinsate samples will be required
- Trip blanks will also need to be collected at a frequency of one for each day that samples are collected for VOC analysis analysis.
- All field data will be validated. All analytical data will require a certificate of analysis, and 10 percent of the analytical data will also require the associated quality assurance/quality control results, and will be validated to ASL B. Analytical data requiring validation will be designated by the Characterization Lead.

If any sample collection or analysis methods are used that are not in accordance with the SCQ, the Project Manager and Characterization Lead must determine if the qualitative data from the samples will be beneficial to predesign decision making. If the data will be beneficial, the Project Manager and Characterization Lead will ensure that:

- the PSP is varianced to include references confirming that the new method is sufficient to support data needs,
- variations from the SCQ methodology are documented in the PSP, or
- data validation of the affected samples is requested or qualifier codes of J (estimated) and R (rejected) be attached to detected and non-detected results, respectively.

3.2 APPLICABLE PROCEDURES, MANUALS AND DOCUMENTS

To assure consistency and data integrity, field activities in support of this PSP will follow the requirements and responsibilities outlined in controlled procedures and manufacturer operational manuals. Applicable procedures, manuals, and documents include:

- SMPL-01, Solids Sampling
- SMPL-02, Liquids and Sludge Sampling
- SMPL-21, Collection of Field Quality Control Samples
- DRL-01, Plugging and Abandonment

- EQT-04, Photoionization Detector
- EQT-06, Geoprobe® Model 5400 Operation and Maintenance Manual
- EW-0002, Chain of Custody/Request for Analysis Record for Sample Control
- 9505, Using the FACTS Database to Process Samples
- 7532, Analytical Laboratory Services Internal Chain of Custody
- RM-0020, Radiological Control Requirements Manual
- RM-0021, Safety Performance Requirements Manual
- Sitewide CERCLA Quality Assurance Project Plan (SCQ)
- Sitewide Excavation Plan (SEP)
- WAC Attainment Plan for the OSDF
- Plant 1 Pad Continuing Release Removal Action Work Plan
- PSP for Sampling Miscellaneous Areas for WAC Attainment
- PSP for Area 4B Potentially Characteristic Area and West of Pilot Plant Predesign Investigation.

3.3 PROJECT REQUIREMENTS FOR INDEPENDENT ASSESSMENTS

Project management has ultimate responsibility for the quality of the work processes and the results of the sampling activities covered by this PSP. Project management can schedule independent assessments of the work processes or operations to assure quality of performance. Assessment will encompass project requirements as defined in this PSP and the SCQ.

3.4 IMPLEMENTATION OF FIELD CHANGES

If field conditions require changes or variances, the Characterization Lead must prepare a V/FCN. The completed V/FCN must contain the signatures of all affected organizations, which at a minimum includes the Project Manager, Characterization Lead, WAO, and Quality Assurance (QA) but may also include Field Sampling or Sample Management Office, as appropriate. A time-critical variance may be obtained in cases where expedited approval is needed to avoid costly project delays. In the case of a time-critical variance, verbal or written approval (electronic mail is acceptable) must be received from the Characterization Lead and from QA prior to implementing the variance. The completed approved V/FCN form must be completed within five working days after the time-critical variance is approved. All significant field changes (sample moves greater than 3 feet, changes from SEP certification strategy, etc.) require regulatory agency approval.

4.0 HEALTH AND SAFETY

The Health and Safety Lead, Field Sampling Leads, and team members will assess the safety of performing sampling activities in the vicinity of each boring location. This will include vehicle/equipment positioning limitations and fall hazards.

Technicians will conform to precautionary surveys performed by Radiological Control, Safety, and Industrial Hygiene personnel. All work on this project will be performed in accordance with applicable Environmental Monitoring procedures, RM-0020 (Radiological Control Requirements Manual), RM-0021 (Safety Performance Requirements Manual), Fluor Fernald work permit, Radiological Work Permit (RWP), penetration permit and other applicable permits. Concurrence with applicable safety permits (as indicated by the signature of each field team member assigned to this project) is required by each team member in the performance of their assigned duties.

The Field Sampling Lead will ensure that each technician performing work related to this project has been trained to the relevant sampling procedures including safety precautions. Technicians who do not sign project safety and technical briefing forms will not participate in any activities related to the completion of assigned project responsibilities. A copy of applicable safety permits/surveys issued for worker safety and health will be posted in the affected area during field activities.

A safety briefing will be conducted prior to the initiation of field activities. All emergencies will be reported immediately to the site communication center at 648-6511 by cell phone, 911 on-site phone, or by contacting "control" on the radio.

5.0 DATA MANAGEMENT

A data management process will be implemented so information collected during the investigation will be properly managed to satisfy data end use requirements after completion of the field activities. As specified in Section 5.1 of the SCQ, sampling teams will describe daily activities on a Field Activity Log, which should be sufficient for accurate reconstruction of the events without reliance on memory. Sample Collection Logs will be completed according to protocol specified in Appendix B of the SCQ and in applicable procedures. These forms will be maintained in loose-leaf form and uniquely numbered following the sampling event. At least weekly, a copy of all field logs will be sent to the Characterization Lead.

All field measurements, observations, and sample collection information associated with physical sample collection will be recorded, as applicable, on the Sample Collection Log, the Field Activity Log, and the Chain of Custody/Request for Analysis Form, as required. The method of sample collection will be specified in the Field Activity Log. Borehole Abandonment Logs are required. The PSP number will be on all documentation associated with these sampling activities.

Samples will be assigned a unique sample number as explained in Section 2.3 and listed in Appendix C. This unique sample identifier will appear on the Sample Collection Log and Chain of Custody/Request for Analysis and will be used to identify the samples during analysis, data entry, and data management.

Technicians will review all field data for completeness and accuracy and then forward the data package to the Field Data Validation Contact for final review. The field data package will be filed in the records of the Environmental Management Project. Analytical data that is designated for data validation will be forwarded to the Data Validation Group. The PSP requirements for analytical data validation are outlined in Section 3.1. Analytical data from the on- and off-site laboratories will be reviewed by the Data Management Lead prior to transfer of the data to the SED from the FACTS database.

Following field and analytical data validation, the Sample Data Management organization will perform data entry into the SED. After entry into the SED, a data group form will be completed for each material tracking location (as identified by WAO) and transmitted to WAO for WAC documentation.

APPENDIX A

AREA 3B/4B/5 DATA FROM BORINGS WITH KNOWN WAC EXCEEDANCES UNDER THIS INVESTIGATION

APPENDIX A
DATA FROM AREA 3B/4B/5 BORINGS WHERE ABOVE-WAC RESULTS WERE IDENTIFIED[a]

Boring	General Area[b]	Date	Top	Bottom	Northing	Easting	Parameter	WAC	Result	Qual	Units	QA Type[c]
PLANT1PAD-21D	Plant 1 Pad	19920407	0	0.5	481368.046	1348454.719	Technetium-99	29.1	118.2	NV	pCi/g	NORMAL
PLANT1PAD-21D	Plant 1 Pad	19920407	0	0.5	481368.046	1348454.719	Uranium, Total	1030	674.86	NV	mg/kg	NORMAL
PLANT1PAD-86	Plant 1 Pad	19920408	0	0.5	481196.986	1348409.021	Technetium-99	29.1	53.7	NV	pCi/g	NORMAL
PLANT1PAD-86	Plant 1 Pad	19920408	0	0.5	481196.986	1348409.021	Uranium, Total	1030	38.389	NV	mg/kg	NORMAL
1179	Plant 2	19891008	1	1.5	480759.218	1348769.485	Uranium, Total	1030	1916	NV	mg/kg	NORMAL
1179	Plant 2	19891008	4.5	5	480759.218	1348769.485	Uranium, Total	1030	285	NV	mg/kg	NORMAL
1179	Plant 2	19891008	5	5.5	480759.218	1348769.485	Uranium, Total	1030	254	NV	mg/kg	NORMAL
1179	Plant 2	19891008	10	10.5	480759.218	1348769.485	Uranium, Total	1030	41	NV	mg/kg	NORMAL
1179	Plant 2	19891008	15	15.5	480759.218	1348769.485	Uranium, Total	1030	152	NV	mg/kg	NORMAL
1183	Plant 2	19891023	0	0.5	480733.399	1348886.285	Technetium-99	29.1	1.8	J	pCi/g	NORMAL
1183	Plant 2	19891023	0.5	1	480733.399	1348886.285	Technetium-99	29.1	1	UJ	pCi/g	NORMAL
1183	Plant 2	19891023	0	0.5	480733.399	1348886.285	Uranium, Total	1030	5310.43	J	mg/kg	NORMAL
1183	Plant 2	19891023	0.5	1	480733.399	1348886.285	Uranium, Total	1030	227.74	J	mg/kg	NORMAL
1183	Plant 2	19891023	1.5	2	480733.399	1348886.285	Uranium, Total	1030	107	J	mg/kg	NORMAL
1183	Plant 2	19891023	11	11	480733.399	1348886.285	Uranium, Total	1030	224	J	mg/kg	NORMAL
1183	Plant 2	19891023	15	15.5	480733.399	1348886.285	Uranium, Total	1030	134	J	mg/kg	NORMAL
1199	Plant 2	19890525	11	11	480627.996	1348744.216	Technetium-99	29.1	1.31	-	pCi/g	NORMAL
1199	Plant 2	19890525	0	0.5	480627.996	1348744.216	Uranium, Total	1030	5685	NV	mg/kg	NORMAL
1199	Plant 2	19890525	2	2.5	480627.996	1348744.216	Uranium, Total	1030	333	NV	mg/kg	NORMAL
1199	Plant 2	19890525	5	5.5	480627.996	1348744.216	Uranium, Total	1030	224	NV	mg/kg	NORMAL
1199	Plant 2	19890525	11	11	480627.996	1348744.216	Uranium, Total	1030	494.74	-	mg/kg	NORMAL
1199	Plant 2	19890525	15	15.5	480627.996	1348744.216	Uranium, Total	1030	735	NV	mg/kg	NORMAL
1236	Plant 8	19890514	0	0.5	480336.437	1349048.679	Technetium-99	29.1	3.31	J	pCi/g	NORMAL
1236	Plant 8	19890514	3	3.5	480336.437	1349048.679	Technetium-99	29.1	1.44	-	pCi/g	NORMAL
1236	Plant 8	19890514	6	6.5	480336.437	1349048.679	Technetium-99	29.1	205	J	pCi/g	NORMAL
1236	Plant 8	19890514	0	0.5	480336.437	1349048.679	Uranium, Total	1030	687.72	J	mg/kg	NORMAL
1236	Plant 8	19890514	3	3.5	480336.437	1349048.679	Uranium, Total	1030	223.76	J	mg/kg	NORMAL
1236	Plant 8	19890514	6	6.5	480336.437	1349048.679	Uranium, Total	1030	377.65	J	mg/kg	NORMAL
1236	Plant 8	19890514	11	11	480336.437	1349048.679	Uranium, Total	1030	55	NV	mg/kg	NORMAL
1798	Plant 8	19911017	0	0.5	480232.106	1348989.87	Technetium-99	29.1	37.4	-	pCi/g	NORMAL
1798	Plant 8	19911017	0	0.5	480232.106	1348989.87	Uranium, Total	1030	75.17	-	mg/kg	NORMAL
1798	Plant 8	19911017	1	1.5	480232.106	1348989.87	Uranium, Total	1030	37.6	-	mg/kg	NORMAL
1798	Plant 8	19911017	2	2.5	480232.106	1348989.87	Uranium, Total	1030	7.4	-	mg/kg	NORMAL
1248	Pilot Plant	19901205	1	1.5	479925.29	1348459.35	Technetium-99	29.1	55.3	J	pCi/g	NORMAL

APPENDIX A

DATA FROM AREA 3B/4B/5 BORINGS WHERE ABOVE-WAC RESULTS WERE IDENTIFIED[a]

Boring	General Area[b]	Date	Top	Bottom	Northing	Easting	Parameter	WAC	Result	Qual	Units	QA Type[c]
1248	Pilot Plant	19901205	1.5	2	479925.29	1348459.35	Technetium-99	29.1	1.5	UJ	pCi/g	NORMAL
1248	Pilot Plant	19901205	1	1.5	479925.29	1348459.35	Uranium, Total	1030	304	J	ug/g	NORMAL
1248	Pilot Plant	19901205	1.5	2	479925.29	1348459.35	Uranium, Total	1030	756	J	ug/g	NORMAL
1248	Pilot Plant	19901205	5	5.5	479925.296	1348459.355	Uranium, Total	1030	703	J	mg/kg	NORMAL
ZONE 1-30	Lab Building	19880630	0	0.5	479683.378	1348778.997	Technetium-99	29.1	2.2	-	pCi/g	NORMAL
ZONE 1-30	Lab Building	19880630	0.5	1	479683.378	1348778.997	Technetium-99	29.1	1	U	pCi/g	NORMAL
ZONE 1-30	Lab Building	19880630	1	1.5	479683.378	1348778.997	Technetium-99	29.1	1	U	pCi/g	NORMAL
ZONE 1-30	Lab Building	19880630	0	0.5	479683.378	1348778.997	Uranium, Total	1030	4314.77	-	mg/kg	NORMAL
ZONE 1-30	Lab Building	19880630	0.5	1	479683.378	1348778.997	Uranium, Total	1030	948.40	-	mg/kg	NORMAL
ZONE 1-30	Lab Building	19880630	1	1.5	479683.378	1348778.997	Uranium, Total	1030	185.88	-	mg/kg	NORMAL
ZONE 1-32	Lab Building	19880630	0	0.5	479695.378	1348769.997	Technetium-99	29.1	1	U	pCi/g	NORMAL
ZONE 1-32	Lab Building	19880630	0.5	1	479695.378	1348769.997	Technetium-99	29.1	1	U	pCi/g	NORMAL
ZONE 1-32	Lab Building	19880630	1	1.5	479695.378	1348769.997	Technetium-99	29.1	1	U	pCi/g	NORMAL
ZONE 1-32	Lab Building	19880630	0	0.5	479695.378	1348769.997	Uranium, Total	1030	998.68	-	mg/kg	NORMAL
ZONE 1-32	Lab Building	19880630	0.5	1	479695.378	1348769.997	Uranium, Total	1030	842.24	-	mg/kg	NORMAL
ZONE 1-32	Lab Building	19880630	1	1.5	479695.378	1348769.997	Uranium, Total	1030	1355.88	-	mg/kg	NORMAL
ZONE 1-33	Lab Building	19880630	0	0.5	479719.378	1348766.497	Technetium-99	29.1	1.1	-	pCi/g	NORMAL
ZONE 1-33	Lab Building	19880630	0.5	1	479719.378	1348766.497	Technetium-99	29.1	1	U	pCi/g	NORMAL
ZONE 1-33	Lab Building	19880630	1	1.5	479719.378	1348766.497	Technetium-99	29.1	1	U	pCi/g	NORMAL
ZONE 1-33	Lab Building	19880630	0	0.5	479719.378	1348766.497	Uranium, Total	1030	23725.57	-	mg/kg	NORMAL
ZONE 1-33	Lab Building	19880630	0.5	1	479719.378	1348766.497	Uranium, Total	1030	1184.72	-	mg/kg	NORMAL
ZONE 1-33	Lab Building	19880630	1	1.5	479719.378	1348766.497	Uranium, Total	1030	2952.19	-	mg/kg	NORMAL
ZONE 1-38	Lab Building	19880413	0	0.5	479720.378	1348766.997	Technetium-99	29.1	320	NV	pCi/g	NORMAL
ZONE 1-38	Lab Building	19880413	0.5	1	479720.378	1348766.997	Technetium-99	29.1	1	UJ	pCi/g	NORMAL
ZONE 1-38	Lab Building	19880413	1	1.5	479720.378	1348766.997	Technetium-99	29.1	1	UJ	pCi/g	NORMAL
ZONE 1-38	Lab Building	19880413	0	0.5	479720.378	1348766.997	Uranium, Total	1030	43063.97	J	mg/kg	NORMAL
ZONE 1-38	Lab Building	19880413	0.5	1	479720.378	1348766.997	Uranium, Total	1030	2242.51	-	mg/kg	NORMAL
ZONE 1-38	Lab Building	19880413	1	1.5	479720.378	1348766.997	Uranium, Total	1030	2815.50	-	mg/kg	NORMAL
ZONE 1-65	Lab Building	19880622	0	0.5	479866.381	1348860.995	Technetium-99	29.1	5.7	-	pCi/g	NORMAL
ZONE 1-65	Lab Building	19880622	0.5	1	479866.381	1348860.995	Technetium-99	29.1	6.1	J	pCi/g	NORMAL
ZONE 1-65	Lab Building	19880622	1	1.5	479866.381	1348860.995	Technetium-99	29.1	3.8	J	pCi/g	NORMAL
ZONE 1-65	Lab Building	19880622	0	0.5	479866.381	1348860.995	Uranium, Total	1030	1239.33	-	mg/kg	NORMAL
ZONE 1-65	Lab Building	19880622	0.5	1	479866.381	1348860.995	Uranium, Total	1030	327.85	J	mg/kg	NORMAL
ZONE 1-65	Lab Building	19880622	1	1.5	479866.381	1348860.995	Uranium, Total	1030	86.76	J	mg/kg	NORMAL

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APPENDIX A

DATA FROM AREA 3B/4B/5 BORINGS WHERE ABOVE-WAC RESULTS WERE IDENTIFIED[a]

Boring	General Area[b]	Date	Top	Bottom	Northing	Easting	Parameter	WAC	Result	Qual	Units	QA Type[c]
ZONE 1-66	Lab Building	19880512	0	0.1667	479887.38	1348769.295	Technetium-99	29.1	20.3	-	pCi/g	NORMAL
ZONE 1-66	Lab Building	19880512	0.2	0.3333	479887.38	1348769.295	Technetium-99	29.1	3.2	NV	pCi/g	NORMAL
ZONE 1-66	Lab Building	19880512	0.3	0.5	479887.38	1348769.295	Technetium-99	29.1	3.4	NV	pCi/g	NORMAL
ZONE 1-66	Lab Building	19880622	0	0.5	479887.38	1348769.295	Technetium-99	29.1	35	-	pCi/g	NORMAL
ZONE 1-66	Lab Building	19880622	0.5	1	479887.38	1348769.295	Technetium-99	29.1	10.2	J	pCi/g	NORMAL
ZONE 1-66	Lab Building	19880622	1	1.5	479887.38	1348769.295	Technetium-99	29.1	4.8	J	pCi/g	NORMAL
ZONE 1-66	Lab Building	19880512	0	0.1667	479887.38	1348769.295	Uranium, Total	1030	7077.27	-	mg/kg	NORMAL
ZONE 1-66	Lab Building	19880512	0.2	0.3333	479887.38	1348769.295	Uranium, Total	1030	1024.49	NV	mg/kg	NORMAL
ZONE 1-66	Lab Building	19880512	0.3	0.5	479887.38	1348769.295	Uranium, Total	1030	754.318	NV	mg/kg	NORMAL
ZONE 1-66	Lab Building	19880622	0	0.5	479887.38	1348769.295	Uranium, Total	1030	7012.92	-	mg/kg	NORMAL
ZONE 1-66	Lab Building	19880622	0.5	1	479887.38	1348769.295	Uranium, Total	1030	1235.35	-	mg/kg	NORMAL
ZONE 1-66	Lab Building	19880622	1	1.5	479887.38	1348769.295	Uranium, Total	1030	379.46	-	mg/kg	NORMAL
ZONE 1-55	H&S Building	19880622	0	0.5	479820.82	1349581.47	Uranium, Total	1030	2680	J	ug/g	EXCAVATED
ZONE 1-79	H&S Building	19880622	0	0.5	479941.22	1349610.06	Uranium, Total	1030	3150	J	ug/g	EXCAVATED
ZONE 1-79	H&S Building	19880622	0.5	1	479941.22	1349610.06	Uranium, Total	1030	1660	J	ug/g	EXCAVATED
ZONE 1-79	H&S Building	19880622	1	1.5	479941.22	1349610.06	Uranium, Total	1030	402	J	ug/g	EXCAVATED

[a] WAC Exceedances are Shaded. Borings 1258 and ZONE-273 fall under the scope of other PSPs, and are not included.

[b] Refers to grouping for organizational purposes only. See Section 2.1 of the PSP

[c] "EXCAVATED" indicates that the soil volume containing this result has been removed

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APPENDIX B

DATA QUALITY OBJECTIVES SL-048, REV. 5

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Control Number ________

Fernald Environmental Management Project

Data Quality Objectives

Title: Delineating the Extent of Constituents of Concern During Remediation Sampling

Number: SL-048

Revision: 5

Effective Date: February 26, 1999

Contact Name: Eric Kroger

Approval: (signature on file) Date: 2/25/99
James E. Chambers
DQO Coordinator

Approval: (signature on file) Date: 2/26/99
J.D. Chiou
SCEP Project Director

Rev. #	0	1	2	3	4	5	6
Effective Date:	9/19/97	10/3/97	4/15/98	6/17/98	7/14/98	2/26/99	

DATA QUALITY OBJECTIVES
Delineating the Extent of Constituents of Concern During Remediation Sampling

Members of Data Quality Objectives (DQO) Scoping Team
The members of the DQO team include a project lead, a project engineer, a field lead, a statistician, a lead chemist, a sampling supervisor, and a data management lead.

Conceptual Model of the Site
Media is considered contaminated if the concentration of a constituent of concern (COC) exceeds the final remediation levels (FRLs). The extent of specific media contamination was estimated and published in the Operable Unit 5 Feasibility Study (FS). These estimates were based on kriging analysis of available data for media collected during the Remedial Investigation (RI) effort and other FEMP environmental characterization studies. Maps outlining contaminated media boundaries were generated for the Operable Unit 5 FS by overlaying the results of the kriging analysis data with isoconcentration maps of the other constituents of concern (COCs), as presented in the Operable Unit 5 RI report, and further modified by spatial analysis of maps reflecting the most current media characterization data. A sequential remediation plan has been presented that subdivides the FEMP into seven construction areas. During the course of remediation, areas of specific media may require additional characterization so remediation can be carried out as thoroughly and efficiently as possible. As a result, additional sampling may be necessary to accurately delineate a volume of specific media as exceeding a target level, such as the FRL or the Waste Attainment Criterion (WAC). Each individual Project-Specific Plan (PSP) will identify and describe the particular media to be sampled. This DQO covers all physical sampling activities associated with Pre-design Investigations, precertification sampling, WAC attainment sampling or regulatory monitoring that is required during site remediation.

1.0 Statement of Problem

If the extent (depth and/or area) of the media COC contamination is unknown, then it must be defined with respect to the appropriate target level (FRL, WAC, or other specified media concentration).

2.0 Identify the Decision

Delineate the horizontal and/or vertical extent of media COC contamination in an area with respect to the appropriate target level.

3.0 Inputs That Affect the Decision

Informational Inputs - Historical data, process history knowledge, the modeled extent of COC contamination, and the origins of contamination will be required to establish a sampling plan to delineate the extent of COC contamination. The desired precision of the delineation must be weighed against the cost of collecting and analyzing additional samples in order to determine the optimal sampling density. The project-specific plan will identify the optimal sampling density.

Action Levels - COCs must be delineated with respect to a specific action level, such as FRLs and On-Site Disposal Facility (OSDF) WAC concentrations. Specific media FRLs are established in the OU2 and OU5 RODs, and the WAC concentrations are published in the OU5 ROD. Media COCs may also require delineation with respect to other action levels that act as remediation drivers, such as Benchmark Toxicity Values (BTVs).

4.0 The Boundaries of the Situation

Temporal Boundaries - Sampling must be completed within a time frame sufficient to meet the remediation schedule. Time frames must allow for the scheduling of sampling and analytical activities, the collection of samples, analysis of samples and the processing of analytical data when received.

Scale of Decision Making - The decision made based upon the data collected in this investigation will be the extent of COC contamination at or above the appropriate action level. This delineation will result in media contaminant concentration information being incorporated into engineering design, and the attainment of established remediation goals.

Parameters of Interest - The parameters of interest are the COCs that have been determined to require additional delineation before remediation design can be finalized with the optimal degree of accuracy.

5.0 Decision Rule

If existing data provide an unacceptable level of uncertainty in the COC delineation model, then additional sampling will take place to decrease the model uncertainty. When deciding what additional data is needed, the costs of additional sampling and analysis must be weighed against the benefit of reduced uncertainty in the delineation model, which will eventually be used for assigning excavation, or for other purposes.

6.0 Limits on Decision Errors

In order to be useful, data must be collected with sufficient areal and depth coverage, and at sufficient density to ensure an accurate delineation of COC concentrations. Analytical sensitivity and reproducibility must be sufficient to differentiate the COC concentrations below their respective target levels.

Types of Decision Errors and Consequences

Decision Error 1 - This decision error occurs when the decision maker determines that the extent of media contaminated with COCs above action levels is not as extensive as it actually is. This error can result in a remediation design that fails to incorporate media contaminated with COC(s) above the action level(s). This could result in the re-mobilization of excavation equipment and delays in the remediation schedule. Also, this could result in media contaminated above action levels remaining after remediation is considered complete, posing a potential threat to human health and the environment.

Decision Error 2 - This decision error occurs when the decision maker determines that the extent of media contaminated above COC action levels is more extensive than it actually is. This error could result in more excavation than necessary, and this excess volume of materials being transferred to the OSDF, or an off-site disposal facility if contamination levels exceed the OSDF WAC.

True State of Nature for the Decision Errors - The true state of nature for Decision Error 1 is that the maximum extent of contamination above the FRL is more extensive than was determined. The true state of nature for Decision Error 2 is that the maximum extent of contamination above the FRL is not as extensive as was determined. Decision Error 1 is the more severe error.

7.0 Optimizing Design for Useable Data

7.1 Sample Collection

A sampling and analytical testing program will delineate the extent of COC contamination in a given area with respect to the action level of interest. Existing data, process knowledge, modeled concentration data, and the origins of contamination will be considered when determining the lateral and vertical extent of sample collection. The cost of collecting and analyzing additional samples will be weighed against the benefit of reduced uncertainty in the delineation model. This will determine the sampling density. Individual PSPs will identify the locations and depths to be sampled, the sampling density necessary to obtain the desired accuracy of the delineation, and if samples will be analyzed by the on-site or off-site laboratory. The PSP will also identify the sampling increments to be selectively analyzed for concentrations of the COC(s) of interest, along with field work requirements. Analytical requirements will be listed in the PSP. The chosen analytical methodologies are able to achieve a detection limit capable of resolving the COC action level. Sampling of groundwater monitoring wells may require different purge requirements than those stated in the SCQ (i.e., dry well definitions or small purge volumes). In order to accommodate sampling of wells that go dry prior to completing the purge of the necessary well volume, attempts to sample the monitoring wells will be made 24 hours after purging the well dry. If, after the 24 hour period, the well does not yield the required volume, the analytes will be collected in the order stated in the applicable PSP until the well goes dry. Any remaining analytes will not be collected. In some instances, after the 24 hour wait the well may not yield any water. For these cases, the well will be considered dry and will not be sampled.

7.2 COC Delineation

The media COC delineation will use all data collected under the PSP, and if deemed appropriate by the Project Lead, may also include existing data obtained from physical samples, and if applicable, information obtained through real-time screening. The delineation may be accomplished through modeling (e.g. kriging) of the COC concentration data with a confidence limit specific to project needs that will reduce the potential for Decision Error 1. A very conservative approach to delineation may also be utilized where the boundaries of the contaminated media are extended to the first known vertical and horizontal sample locations that reveal concentrations below the desired action level.

7.3 QC Considerations

Laboratory work will follow the requirements specified in the SCQ. If analysis is to be carried out by an off-site laboratory, it will be a Fluor Daniel Fernald approved full service laboratory. Laboratory quality control measures include a media prep blank, a laboratory control sample (LCS), matrix duplicates and matrix spike. Typical Field QC samples are not required for ASL B analysis. However the PSPs may specify appropriate field QC samples for the media type with respect to the ASL in accordance with the SCQ, such as field blanks, trip blanks, and container blanks. All field QC samples will be analyzed at the associated field sample ASL. Data will be validated per project requirements, which must meet the requirements specified in the SCQ. Project-specific validation requirements will be listed in the PSP.

Per the Sitewide Excavation Plan, the following ASL and data validation requirements apply to all **soil and soil field QC samples** collected in association with this DQO:

- If samples are analyzed for Pre-design Investigations and/or Precertification, 100% of the data will be analyzed per ASL B requirements. For each laboratory used for a project, 90% of the data will require only a Certificate of Analysis, the other 10% will require the Certificate of Analysis and all associated QA/QC results, and will be validated to ASL B. Per Appendix H of the SEP, the minimum detection level (MDL) for these analyses will be established at approximately 10% of the action level (the action level for precertification is the

FRL; the action level for pre-design investigations can be several different action levels, including the FRL, the WAC, RCRA levels, ALARA levels, etc.). If this MDL is different from the SCQ-specified MDL, the ASL will default to ASL E, though other analytical requirements will remain as specified for ASL B.

- If samples are analyzed for WAC Attainment and/or RCRA Characteristic Areas Delineation, 100% of the data will be analyzed and reported to ASL B with 10% validated. The ASL B package will include a Certificate of Analysis along with all associated QA/QC results. Total uranium analyses using a higher detection limit than is required for ASL B (10 mg/kg) may be appropriate for WAC attainment purposes since the WAC limit for total uranium is 1,030 mg/kg. In this case, an ASL E designation will apply to the analysis and reporting to be performed under the following conditions:

    - all of the ASL B laboratory QA/QC methods and reporting criteria will apply with the exception of the total uranium detection limit

    - the detection limit will be ≤10% of the WAC limit (e.g., ≤103 mg/kg for total uranium).

- If delineation data are also to be used for certification, the data must meet the data quality objectives specified in the Certification DQO (SL-043).

- Validation will include field validation of field packages for ASL B or ASL D data.

All data will undergo an evaluation by the Project Team, including a comparison for consistency with historical data. Deviations from QC considerations resulting from evaluating inputs to the decision from Section 3, must be justified in the PSP such that the objectives of the decision rule in Section 5 are met.

7.4 Independent Assessment

Independent assessment shall be performed by the FEMP QA organization by conducting surveillances. Surveillances will be planned and documented in accordance with Section 12.3 of the SCQ.

7.5 Data Management

Upon receipt from the laboratory, all results will be entered into the SED as qualified data using standard data entry protocol. The required ASL B, D or E data will undergo analytical validation by the FEMP validation team, as required (see Section 7.3). The Project Manager will be responsible to determine data usability as it pertains to supporting the DQO decision of determining delineation of media

COC's.

7.6 Applicable Procedures

Sample collection will be described in the PSP with a listing of applicable procedures. Typical related plans and procedures are the following:

- Sitewide Excavation Plan (SEP)
- Sitewide CERCLA Quality Assurance Project Plan (SCQ).
- SMPL-01, *Solids Sampling*
- SMPL-02, *Liquids and Sludge Sampling*
- SMPL-21, *Collection of Field Quality Control Samples*
- EQT-06, *Geoprobe® Model 5400 Operation and Maintenance*
- EQT-23, *Operation of High Purity Germanium Detectors*
- EQT-30, *Operation of Radiation Tracking Vehicle Sodium Iodide Detection System*

Data Quality Objectives
Delineating the Extent of Constituents of Concern During Remediation Sampling

1A. Task/Description: Delineating the extent of contamination above the FRLs

1.B. Project Phase: (Put an X in the appropriate selection.)

RI ☐ FS ☐ RD ☒ RA ☐ RvA ☐ OTHER ☐

1.C. DQO No.: SL-048, Rev. 5 DQO Reference No.:____________

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2. Media Characterization: (Put an X in the appropriate selection.)

Air ☐ Biological ☐ Groundwater ☒ Sediment ☒ Soil ☒

Waste ☒ Wastewater ☐ Surface water ☐ Other (specify) _____

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3. Data Use with Analytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization
A ☐ B ☒ C ☐ D ☒ E ☒

Risk Assessment
A ☐ B ☐ C ☐ D ☐ E ☐

Evaluation of Alternatives
A ☐ B ☐ C ☐ D ☐ E ☐

Engineering Design
A ☐ B ☒ C ☐ D ☒ E ☒

Monitoring during remediation
A ☒ B ☒ C ☐ D ☒ E ☒

Other
A ☐ B ☐ C ☐ D ☐ E ☐

4.A. Drivers: Remedial Action Work Plans, Applicable or Relevant and Appropriate Requirements (ARARs) and the OU2 and/or OU5 Record of Decision (ROD).

4.B. Objective: Delineate the extent of media contaminated with a COC (or COCs) with respect to the action level(s) of interest.

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5. Site Information (Description):

6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

1. pH	[X] *	2. Uranium	[X] *	3. BTX	[ ]
Temperature	[X] *	Full Radiological	[X] *	TPH	[ ]
Specific Conductance	[X] *	Metals	[X] *	Oil/Grease	[ ]
Dissolved Oxygen	[X] *	Cyanide	[ ]		
Technetium-99	[X] *	Silica	[ ]		

4. Cations	[ ]	5. VOA	[X] *	6. Other (specify)
Anions	[ ]	BNA	[X] *	
TOC	[ ]	Pesticides	[X] *	
TCLP	[X] *	PCB	[X] *	
CEC	[ ]	COD	[ ]	

*If constituent is identified for delineation in the individual PSP.

6.B. Equipment Selection and SCQ Reference:

Equipment Selection		Refer to SCQ Section
ASL A		SCQ Section:
ASL B	X	SCQ Section: App. G Tables G-1&G-3
ASL C		SCQ Section:
ASL D	X	SCQ Section: App. G Tables G-1&G-3
ASL E	X (See sect. 7.3, pg. 6)	SCQ Section: App. G Tables G-1&G-3

7.A. Sampling Methods: (Put an X in the appropriate selection.)

Biased [X] Composite [ ] Environmental [X] Grab [X] Grid [X]

Intrusive [X] Non-Intrusive [ ] Phased [ ] Source [ ]

DQO Number: SL-048, Rev. 5

7.B. Sample Work Plan Reference: This DQO is being written prior to the PSPs.

Background samples: OU5 RI

7.C. Sample Collection Reference:

Sample Collection Reference: SMPL-01, SMPL-02, EQT-06

---

8. Quality Control Samples: (Place an "X" in the appropriate selection box.)

8.A. Field Quality Control Samples:

Trip Blanks	[X]*	Container Blanks	[X]++
Field Blanks	[X]+	Duplicate Samples	[X]***
Equipment Rinsate Samples	[X]***	Split Samples	[X]**
Preservative Blanks	[ ]	Performance Evaluation Samples	[ ]
Other (specify)			

* For volatile organics only
** Split samples will be collected where required by EPA or OEPA.
*** If specified in PSP.
\+ Collected at the discretion of the Project Manager (if warranted by field conditions)
++ One per Area and Phase Area per container type (i.e. stainless steel core liner/plastic core liner/Geoprobe tube).

8.B. Laboratory Quality Control Samples:

Method Blank	[X]	Matrix Duplicate/Replicate	[X]
Matrix Spike	[X]	Surrogate Spikes	[ ]
Tracer Spike	[ ]		

Other (specify) Per SCQ

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.

APPENDIX C

SOIL SAMPLES TO BE COLLECTED FOR THE INVESTIGATION OF KNOWN WAC EXCEEDANCES IN AREAS 3B/4B/5

APPENDIX C
USING THE SAMPLE IDENTIFICATION TABLES

Data collected under this PSP will ultimately be used to define remedial excavation depths in this part of the site. Therefore, it is critical to be able to link each sample to an actual *depth below surface* that it was collected. However, varying amounts of overlying materials (concrete, asphalt, gravel, etc.) may exist at the different boring locations. These materials cannot be considered for sample collection, but must be accounted for when defining excavation depth. As a result, the actual depth at which soil sample collection will begin cannot be determined before the actual boring activity and consequently, this PSP can only identify soil intervals as *depth below overlying material.*

To account for the above, the depth identifier will initially be a sequential letter that denotes each sample for collection at a *depth beneath overlying material.* The sample specified for collection closest to the surface is identified as "a", the next deepest sample specified for collection is identified as "b", and so on. Upon collection, the sampling technician will replace the letter with a number that corresponds to a 6-inch interval of the actual *depth below surface.* So the 0 to 0.5-foot sample would be identified with a "1"; the 0.5 to 1-foot sample would be identified with a "2", and so on. This number can be calculated as two times the bottom depth (below surface) of the 6-inch interval.

So assume a boring specifies the collection of the 0 to 0.5-foot, 3 to 3.5-foot and 6 to 6.5-foot intervals below overlying material. The samples are identified as -a, -b and -c, respectively. Now assume that 12 inches of overlying material is discovered at that location. That would mean that the most shallow sample would then be collected at 1 to 1.5 feet below surface, and a number "3" [two times 1.5 feet (the bottom depth)] would replace the letter "a". The second sample would be collected at 4 to 4.5 feet below surface, and the number "9" would replace the letter "b", and the third sample would be collected at 7 to 7.5 feet below surface, and the number "15" would replace the letter "c".

This appendix lists all samples increments (depths below overlying material) to be collected from each boring. If any uncertainty exists at the time of sampling about the correct sampling interval or any sampling contingencies that arise, the Field Sampling Lead should contact the Characterization Lead for direction.

PLANT 1 PAD AREA						
Location	**Northing**	**Easting**	**Depth Below Overlying Material**	**Depth ID[a]**	**Sample ID[b]**	**TAL**
A3B-P1P-01	481368.04	1348454.71	0-0.5	a	A3B-P1P-01-a-R	B
					A3B-P1P-01-a-OR	D
			1-1.5	b	A3B-P1P-01-b-R	B
					A3B-P1P-01-b-OR	D
			3-3.5	c	A3B-P1P-01-c-R	B
					A3B-P1P-01-c-OR	D
			6-6.5	d	A3B-P1P-01-d-R	B
					A3B-P1P-01-d-OR	D
A3B-P1P-02	481373.04	1348454.71	0-0.5	a	A3B-P1P-02-a-R	B
					A3B-P1P-02-a-OR	D
			1-1.5	b	A3B-P1P-02-b-R	B
					A3B-P1P-02-b-OR	D
			3-3.5	c	A3B-P1P-02-c-R	B
					A3B-P1P-02-c-OR	D
			6-6.5	d	A3B-P1P-02-d-R	B
					A3B-P1P-02-d-OR	D
A3B-P1P-03	481368.04	1348459.71	0-0.5	a	A3B-P1P-03-a-R	B
					A3B-P1P-03-a-OR	D
			1-1.5	b	A3B-P1P-03-b-R	B
					A3B-P1P-03-b-OR	D
			3-3.5	c	A3B-P1P-03-c-R	B
					A3B-P1P-03-c-OR	D
			6-6.5	d	A3B-P1P-03-d-R	B
					A3B-P1P-03-d-OR	D
A3B-P1P-04	481363.04	1348454.71	0-0.5	a	A3B-P1P-04-a-R	B
					A3B-P1P-04-a-OR	D
			1-1.5	b	A3B-P1P-04-b-R	B
					A3B-P1P-04-b-OR	D
			3-3.5	c	A3B-P1P-04-c-R	B
					A3B-P1P-04-c-OR	D
			6-6.5	d	A3B-P1P-04-d-R	B
					A3B-P1P-04-d-OR	D
A3B-P1P-05	481368.04	1348449.71	0-0.5	a	A3B-P1P-05-a-R	B
					A3B-P1P-05-a-OR	D
			1-1.5	b	A3B-P1P-05-b-R	B
					A3B-P1P-05-b-OR	D
			3-3.5	c	A3B-P1P-05-c-R	B
					A3B-P1P-05-c-OR	D
			6-6.5	d	A3B-P1P-05-d-R	B
					A3B-P1P-05-d-OR	D

PLANT 1 PAD AREA						
Location	**Northing**	**Easting**	**Depth Below Overlying Material**	**Depth ID[a]**	**Sample ID[b]**	**TAL**
A3B-P1P-06	481383.04	1348454.71	0-0.5	a	A3B-P1P-06-a-R	B
					A3B-P1P-06-a-OR	D
			1-1.5	b	A3B-P1P-06-b-R	B
					A3B-P1P-06-b-OR	D
			3-3.5	c	A3B-P1P-06-c-R	B
					A3B-P1P-06-c-OR	D
			6-6.5	d	A3B-P1P-06-d-R	B
					A3B-P1P-06-d-OR	D
A3B-P1P-07	481368.04	1348469.71	0-0.5	a	A3B-P1P-07-a-R	B
					A3B-P1P-07-a-OR	D
			1-1.5	b	A3B-P1P-07-b-R	B
					A3B-P1P-07-b-OR	D
			3-3.5	c	A3B-P1P-07-c-R	B
					A3B-P1P-07-c-OR	D
			6-6.5	d	A3B-P1P-07-d-R	B
					A3B-P1P-07-d-OR	D
A3B-P1P-08	481353.04	1348454.71	0-0.5	a	A3B-P1P-08-a-R	B
					A3B-P1P-08-a-OR	D
			1-1.5	b	A3B-P1P-08-b-R	B
					A3B-P1P-08-b-OR	D
			3-3.5	c	A3B-P1P-08-c-R	B
					A3B-P1P-08-c-OR	D
			6-6.5	d	A3B-P1P-08-d-R	B
					A3B-P1P-08-d-OR	D
A3B-P1P-09	481368.04	1348439.71	0-0.5	a	A3B-P1P-09-a-R	B
					A3B-P1P-09-a-OR	D
			1-1.5	b	A3B-P1P-09-b-R	B
					A3B-P1P-09-b-OR	D
			3-3.5	c	A3B-P1P-09-c-R	B
					A3B-P1P-09-c-OR	D
			6-6.5	d	A3B-P1P-09-d-R	B
					A3B-P1P-09-d-OR	D
A3B-P1P-10	481197.1	1348408.97	0-0.5	a	A3B-P1P-10-a-R	B
					A3B-P1P-10-a-OR	D
			1-1.5	b	A3B-P1P-10-b-R	B
					A3B-P1P-10-b-OR	D
			3-3.5	c	A3B-P1P-10-c-R	B
					A3B-P1P-10-c-OR	D
			6-6.5	d	A3B-P1P-10-d-R	B
					A3B-P1P-10-d-OR	D

PLANT 1 PAD AREA						
Location	**Northing**	**Easting**	**Depth Below Overlying Material**	**Depth ID[a]**	**Sample ID[b]**	**TAL**
A3B-P1P-11	481202.53	1348409.1	0-0.5	a	A3B-P1P-11-a-R	B
					A3B-P1P-11-a-OR	D
			1-1.5	b	A3B-P1P-11-b-R	B
					A3B-P1P-11-b-OR	D
			3-3.5	c	A3B-P1P-11-c-R	B
					A3B-P1P-11-c-OR	D
			6-6.5	d	A3B-P1P-11-d-R	B
					A3B-P1P-11-d-OR	D
A3B-P1P-12	481197.53	1348414.1	0-0.5	a	A3B-P1P-12-a-R	B
					A3B-P1P-12-a-OR	D
			1-1.5	b	A3B-P1P-12-b-R	B
					A3B-P1P-12-b-OR	D
			3-3.5	c	A3B-P1P-12-c-R	B
					A3B-P1P-12-c-OR	D
			6-6.5	d	A3B-P1P-12-d-R	B
					A3B-P1P-12-d-OR	D
A3B-P1P-13	481192.53	1348409.1	0-0.5	a	A3B-P1P-13-a-R	B
					A3B-P1P-13-a-OR	D
			1-1.5	b	A3B-P1P-13-b-R	B
					A3B-P1P-13-b-OR	D
			3-3.5	c	A3B-P1P-13-c-R	B
					A3B-P1P-13-c-OR	D
			6-6.5	d	A3B-P1P-13-d-R	B
					A3B-P1P-13-d-OR	D
A3B-P1P-14	481197.53	1348404.1	0-0.5	a	A3B-P1P-14-a-R	B
					A3B-P1P-14-a-OR	D
			1-1.5	b	A3B-P1P-14-b-R	B
					A3B-P1P-14-b-OR	D
			3-3.5	c	A3B-P1P-14-c-R	B
					A3B-P1P-14-c-OR	D
			6-6.5	d	A3B-P1P-14-d-R	B
					A3B-P1P-14-d-OR	D

[a] Temporary identifier corresponds to increment planned for collection below overlying material
[b] The depth identifier (a, b, c, etc.) will be replaced with a depth identification number that represents *depth below surface*. The depth identification number is equal to a sample increment's bottom depth below surface multiplied by 2.

PLANT 2 AREA						
Location	**Northing**	**Easting**	**Depth Below Overlying Material**	**Depth ID[a]**	**Sample ID[b]**	**TAL**
A4B-P2-01	480759.21	1348769.48	0-0.5	a	A4B-P2-01-a-R	B
			1-1.5	b	A4B-P2-01-b-R	B
			2-2.5	c	A4B-P2-01-c-R	B
			4-4.5	d	A4B-P2-01-d-R	B
A4B-P2-02	480764.21	1348769.48	0-0.5	a	A4B-P2-02-a-R	B
			1-1.5	b	A4B-P2-02-b-R	B
			2-2.5	c	A4B-P2-02-c-R	B
			4-4.5	d	A4B-P2-02-d-R	B
A4B-P2-03	480759.21	1348774.48	0-0.5	a	A4B-P2-03-a-R	B
			1-1.5	b	A4B-P2-03-b-R	B
			2-2.5	c	A4B-P2-03-c-R	B
			4-4.5	d	A4B-P2-03-d-R	B
A4B-P2-04	480754.21	1348769.48	0-0.5	a	A4B-P2-04-a-R	B
			1-1.5	b	A4B-P2-04-b-R	B
			2-2.5	c	A4B-P2-04-c-R	B
			4-4.5	d	A4B-P2-04-d-R	B
A4B-P2-05	480759.21	1348764.48	0-0.5	a	A4B-P2-05-a-R	B
			1-1.5	b	A4B-P2-05-b-R	B
			2-2.5	c	A4B-P2-05-c-R	B
			4-4.5	d	A4B-P2-05-d-R	B
A4B-P2-06	480733.39	1348886.28	0-0.5	a	A4B-P2-06-a-R	B
			1-1.5	b	A4B-P2-06-b-R	B
			3-3.5	c	A4B-P2-06-c-R	B
A4B-P2-07	480733.39	1348881.28	0-0.5	a	A4B-P2-07-a-R	B
			1-1.5	b	A4B-P2-07-b-R	B
			3-3.5	c	A4B-P2-07-c-R	B
A4B-P2-08	480733.39	1348891.28	0-0.5	a	A4B-P2-08-a-R	B
			1-1.5	b	A4B-P2-08-b-R	B
			3-3.5	c	A4B-P2-08-c-R	B
A4B-P2-09	480738.39	1348886.28	0-0.5	a	A4B-P2-09-a-R	B
			1-1.5	b	A4B-P2-09-b-R	B
			3-3.5	c	A4B-P2-09-c-R	B
A4B-P2-10	480733.39	1348881.28	0-0.5	a	A4B-P2-10-a-R	B
			1-1.5	b	A4B-P2-10-b-R	B
			3-3.5	c	A4B-P2-10-c-R	B
A4B-P2-11	480748.39	1348886.28	0-0.5	a	A4B-P2-11-a-R	B
			1-1.5	b	A4B-P2-11-b-R	B
			3-3.5	c	A4B-P2-11-c-R	B
A4B-P2-12	480733.39	1348901.28	0-0.5	a	A4B-P2-12-a-R	B
			1-1.5	b	A4B-P2-12-b-R	B
			3-3.5	c	A4B-P2-12-c-R	B
A4B-P2-13	480718.39	1348886.28	0-0.5	a	A4B-P2-13-a-R	B
			1-1.5	b	A4B-P2-13-b-R	B
			3-3.5	c	A4B-P2-13-c-R	B

PLANT 2 AREA						
Location	**Northing**	**Easting**	**Depth Below Overlying Material**	**Depth ID[a]**	**Sample ID[b]**	**TAL**
A4B-P2-14	480733.39	1348871.28	0-0.5	a	A4B-P2-14-a-R	B
			1-1.5	b	A4B-P2-14-b-R	B
			3-3.5	c	A4B-P2-14-c-R	B
A4B-P2-15	480627.99	1348744.21	0-0.5	a	A4B-P2-15-a-R	B
			1-1.5	b	A4B-P2-15-b-R	B
			3-3.5	c	A4B-P2-15-c-R	B
A4B-P2-16	480632.99	1348744.21	0-0.5	a	A4B-P2-16-a-R	B
			1-1.5	b	A4B-P2-16-b-R	B
			3-3.5	c	A4B-P2-16-c-R	B
A4B-P2-17	480627.99	1348749.21	0-0.5	a	A4B-P2-17-a-R	B
			1-1.5	b	A4B-P2-17-b-R	B
			3-3.5	c	A4B-P2-17-c-R	B
A4B-P2-18	480622.99	1348744.21	0-0.5	a	A4B-P2-18-a-R	B
			1-1.5	b	A4B-P2-18-b-R	B
			3-3.5	c	A4B-P2-18-c-R	B
A4B-P2-19	480627.99	1348739.21	0-0.5	a	A4B-P2-19-a-R	B
			1-1.5	b	A4B-P2-19-b-R	B
			3-3.5	c	A4B-P2-19-c-R	B
A4B-P2-20	480627.99	1348759.21	0-0.5	a	A4B-P2-20-a-R	B
			1-1.5	b	A4B-P2-20-b-R	B
			3-3.5	c	A4B-P2-20-c-R	B
A4B-P2-21	480612.99	1348744.21	0-0.5	a	A4B-P2-21-a-R	B
			1-1.5	b	A4B-P2-21-b-R	B
			3-3.5	c	A4B-P2-21-c-R	B
A4B-P2-22	480627.99	1348729.21	0-0.5	a	A4B-P2-22-a-R	B
			1-1.5	b	A4B-P2-22-b-R	B
			3-3.5	c	A4B-P2-22-c-R	B
A4B-P2-23	480642.99	1348744.07	0-0.5	a	A4B-P2-23-a-R	B
			1-1.5	b	A4B-P2-23-b-R	B
			3-3.5	c	A4B-P2-23-c-R	B

[a] Temporary identifier corresponds to increment planned for collection below overlying material
[b] The depth identifier (a, b, c, etc.) will be replaced with a depth identification number that represents *depth below surface*. The depth identification number is equal to a sample increment's bottom depth below surface multiplied by 2.

PLANT 8 AREA						
Location	**Northing**	**Easting**	**Depth Below Overlying Material**	**Depth ID**[a]	**Sample ID**[b]	**TAL**
A4B-P8-01	480336.43	1349048.67	6-6.5	a	A4B-P8-01-a-R	B
					A4B-P8-01-a-OR	D
			7-7.5	b	A4B-P8-01-b-R	B
					A4B-P8-01-b-OR	D
			9-9.5	c	A4B-P8-01-c-R	B
					A4B-P8-01-c-OR	D
			12-12.5	d	A4B-P8-01-d-R	B
					A4B-P8-01-d-OR	D
			14.5-15	e	A4B-P8-01-e-R	B
					A4B-P8-01-e-OR	D
A4B-P8-02	480341.43	1349048.67	6-6.5	a	A4B-P8-02-a-R	B
					A4B-P8-02-a-OR	D
			7-7.5	b	A4B-P8-02-b-R	B
					A4B-P8-02-b-OR	D
			9-9.5	c	A4B-P8-02-c-R	B
					A4B-P8-02-c-OR	D
			12-12.5	d	A4B-P8-02-d-R	B
					A4B-P8-02-d-OR	D
			14.5-15	e	A4B-P8-02-e-R	B
					A4B-P8-02-e-OR	D
A4B-P8-03	480336.43	1349053.67	6-6.5	a	A4B-P8-03-a-R	B
					A4B-P8-03-a-OR	D
			7-7.5	b	A4B-P8-03-b-R	B
					A4B-P8-03-b-OR	D
			9-9.5	c	A4B-P8-03-c-R	B
					A4B-P8-03-c-OR	D
			12-12.5	d	A4B-P8-03-d-R	B
					A4B-P8-03-d-OR	D
			14.5-15	e	A4B-P8-03-e-R	B
					A4B-P8-03-e-OR	D
A4B-P8-04	480331.43	1349048.67	6-6.5	a	A4B-P8-04-a-R	B
					A4B-P8-04-a-OR	D
			7-7.5	b	A4B-P8-04-b-R	B
					A4B-P8-04-b-OR	D
			9-9.5	c	A4B-P8-04-c-R	B
					A4B-P8-04-c-OR	D
			12-12.5	d	A4B-P8-04-d-R	B
					A4B-P8-04-d-OR	D
			14.5-15	e	A4B-P8-04-e-R	B
					A4B-P8-04-e-OR	D

PLANT 8 AREA						
Location	**Northing**	**Easting**	**Depth Below Overlying Material**	**Depth ID[a]**	**Sample ID[b]**	**TAL**
A4B-P8-05	480336.43	1349043.67	6-6.5	a	A4B-P8-05-a-R	B
					A4B-P8-05-a-OR	D
			7-7.5	b	A4B-P8-05-b-R	B
					A4B-P8-05-b-OR	D
			9-9.5	c	A4B-P8-05-c-R	B
					A4B-P8-05-c-OR	D
			12-12.5	d	A4B-P8-05-d-R	B
					A4B-P8-05-d-OR	D
			14.5-15	e	A4B-P8-05-e-R	B
					A4B-P8-05-e-OR	D
A4B-P8-06	480351.43	1349048.67	6-6.5	a	A4B-P8-06-a-R	B
					A4B-P8-06-a-OR	D
			7-7.5	b	A4B-P8-06-b-R	B
					A4B-P8-06-b-OR	D
			9-9.5	c	A4B-P8-06-c-R	B
					A4B-P8-06-c-OR	D
			12-12.5	d	A4B-P8-06-d-R	B
					A4B-P8-06-d-OR	D
			14.5-15	e	A4B-P8-06-e-R	B
					A4B-P8-06-e-OR	D
A4B-P8-07	480336.43	1349063.67	6-6.5	a	A4B-P8-07-a-R	B
					A4B-P8-07-a-OR	D
			7-7.5	b	A4B-P8-07-b-R	B
					A4B-P8-07-b-OR	D
			9-9.5	c	A4B-P8-07-c-R	B
					A4B-P8-07-c-OR	D
			12-12.5	d	A4B-P8-07-d-R	B
					A4B-P8-07-d-OR	D
			14.5-15	e	A4B-P8-07-e-R	B
					A4B-P8-07-e-OR	D
A4B-P8-08	480321.43	1349048.67	6-6.5	a	A4B-P8-08-a-R	B
					A4B-P8-08-a-OR	D
			7-7.5	b	A4B-P8-08-b-R	B
					A4B-P8-08-b-OR	D
			9-9.5	c	A4B-P8-08-c-R	B
					A4B-P8-08-c-OR	D
			12-12.5	d	A4B-P8-08-d-R	B
					A4B-P8-08-d-OR	D
			14.5-15	e	A4B-P8-08-e-R	B
					A4B-P8-08-e-OR	D

PLANT 8 AREA

Location	Northing	Easting	Depth Below Overlying Material	Depth ID[a]	Sample ID[b]	TAL
A4B-P8-09	480336.43	1349033.67	6-6.5	a	A4B-P8-09-a-R	B
					A4B-P8-09-a-OR	D
			7-7.5	b	A4B-P8-09-b-R	B
					A4B-P8-09-b-OR	D
			9-9.5	c	A4B-P8-09-c-R	B
					A4B-P8-09-c-OR	D
			12-12.5	d	A4B-P8-09-d-R	B
					A4B-P8-09-d-OR	D
			14.5-15	e	A4B-P8-09-e-R	B
					A4B-P8-09-e-OR	D
A4B-P8-10	480232.1	1348989.87	0-0.5	a	A4B-P8-10-a-R	B
					A4B-P8-10-a-OR	D
			3-3.5	b	A4B-P8-10-b-R	B
					A4B-P8-10-b-OR	D
			6-6.5	c	A4B-P8-10-c-R	B
					A4B-P8-10-c-OR	D
A4B-P8-11	480237.1	1348989.87	0-0.5	a	A4B-P8-11-a-R	B
					A4B-P8-11-a-OR	D
			3-3.5	b	A4B-P8-11-b-R	B
					A4B-P8-11-b-OR	D
			6-6.5	c	A4B-P8-11-c-R	B
					A4B-P8-11-c-OR	D
A4B-P8-12	480232.1	1348994.87	0-0.5	a	A4B-P8-12-a-R	B
					A4B-P8-12-a-OR	D
			3-3.5	b	A4B-P8-12-b-R	B
					A4B-P8-12-b-OR	D
			6-6.5	c	A4B-P8-12-c-R	B
					A4B-P8-12-c-OR	D
A4B-P8-13	480227.1	1348989.87	0-0.5	a	A4B-P8-13-a-R	B
					A4B-P8-13-a-OR	D
			3-3.5	b	A4B-P8-12-b-R	B
					A4B-P8-13-b-OR	D
			6-6.5	c	A4B-P8-13-c-R	B
					A4B-P8-13-c-OR	D
A4B-P8-14	480232.1	1348984.87	0-0.5	a	A4B-P8-14-a-R	B
					A4B-P8-14-a-OR	D
			3-3.5	b	A4B-P8-14-b-R	B
					A4B-P8-14-b-OR	D
			6-6.5	c	A4B-P8-14-c-R	B
					A4B-P8-14-c-OR	D

[a] Temporary identifier corresponds to increment planned for collection below overlying material
[b] The depth identifier (a, b, c, etc.) will be replaced with a depth identification number that represents *depth below surface*. The depth identification number is equal to a sample increment's bottom depth below surface multiplied by 2.

PILOT PLANT AREA						
Location	Northing	Easting	Depth Below Overlying Material	Depth ID[a]	Sample ID[b]	TAL
A4B-PP-01	479925.29	1348459.35	0-0.5	a	A4B-PP-01-a-R	B
					A4B-PP-01-a-OR	D
			1-1.5	b	A4B-PP-01-b-R	B
					A4B-PP-01-b-OR	D
			2-2.5	c	A4B-PP-01-c-R	B
					A4B-PP-01-c-OR	D
			4-4.5	d	A4B-PP-01-d-R	B
					A4B-PP-01-d-OR	D
			7-7.5	e	A4B-PP-01-e-R	B
					A4B-PP-01-e-OR	D
A4B-PP02	479930.29	1348459.35	0-0.5	a	A4B-PP-02-a-R	B
					A4B-PP-02-a-OR	D
			1-1.5	b	A4B-PP-02-b-R	B
					A4B-PP-02-b-OR	D
			2-2.5	c	A4B-PP-02-c-R	B
					A4B-PP-02-c-OR	D
			4-4.5	d	A4B-PP-02-d-R	B
					A4B-PP-02-d-OR	D
			7-7.5	e	A4B-PP-02-e-R	B
					A4B-PP-02-e-OR	D
A4B-PP-03	479925.29	1348464.35	0-0.5	a	A4B-PP-03-a-R	B
					A4B-PP-03-a-OR	D
			1-1.5	b	A4B-PP-03-b-R	B
					A4B-PP-03-b-OR	D
			2-2.5	c	A4B-PP-03-c-R	B
					A4B-PP-03-c-OR	D
			4-4.5	d	A4B-PP-03-d-R	B
					A4B-PP-03-d-OR	D
			7-7.5	e	A4B-PP-03-e-R	B
					A4B-PP-03-e-OR	D
A4B-PP-04	479920.29	1348459.35	0-0.5	a	A4B-PP-04-a-R	B
					A4B-PP-04-a-OR	D
			1-1.5	b	A4B-PP-04-b-R	B
					A4B-PP-04-b-OR	D
			2-2.5	c	A4B-PP-04-c-R	B
					A4B-PP-04-c-OR	D
			4-4.5	d	A4B-PP-04-d-R	B
					A4B-PP-04-d-OR	D
			7-7.5	e	A4B-PP-04-e-R	B
					A4B-PP-04-e-OR	D

PILOT PLANT AREA						
Location	**Northing**	**Easting**	**Depth Below Overlying Material**	**Depth ID**[a]	**Sample ID**[b]	**TAL**
A4B-PP-05	479925.66	1348455.2	0-0.5	a	A4B-PP-05-a-R	B
					A4B-PP-05-a-OR	D
			1-1.5	b	A4B-PP-05-b-R	B
					A4B-PP-05-b-OR	D
			2-2.5	c	A4B-PP-05-c-R	B
					A4B-PP-05-c-OR	D
			4-4.5	d	A4B-PP-05-d-R	B
					A4B-PP-05-d-OR	D
			7-7.5	e	A4B-PP-05-e-R	B
					A4B-PP-05-e-OR	D

[a] Temporary identifier corresponds to increment planned for collection below overlying material
[b] The depth identifier (a, b, c, etc.) will be replaced with a depth identification number that represents *depth below surface*. The depth identification number is equal to a sample increment's bottom depth below surface multiplied by 2.

LABORATORY BUILDING AREA						
Location	**Northing**	**Easting**	**Depth Below Overlying Material**	**Depth ID**[a]	**Sample ID**[b]	**TAL**
A4B-LAB-01	479887.37	1348769.29	0-0.5	a	A4B-LAB-01-a-R	B
					A4B-LAB-01-a-OR	D
			1-1.5	b	A4B-LAB-01-b-R	B
					A4B-LAB-01-b-OR	D
			3.5-4	c	A4B-LAB-01-c-R	B
					A4B-LAB-01-c-OR	D
A4B-LAB-02	479892.37	1348769.29	0-0.5	a	A4B-LAB-02-a-R	B
					A4B-LAB-02-a-OR	D
			1-1.5	b	A4B-LAB-02-b-R	B
					A4B-LAB-02-b-OR	D
			3.5-4	c	A4B-LAB-02-c-R	B
					A4B-LAB-02-c-OR	D
A4B-LAB-03	479887.37	1348774.29	0-0.5	a	A4B-LAB-03-a-R	B
					A4B-LAB-03-a-OR	D
			1-1.5	b	A4B-LAB-03-b-R	B
					A4B-LAB-03-b-OR	D
			3.5-4	c	A4B-LAB-03-c-R	B
					A4B-LAB-03-c-OR	D
A4B-LAB-04	479882.37	1348769.29	0-0.5	a	A4B-LAB-04-a-R	B
					A4B-LAB-04-a-OR	D
			1-1.5	b	A4B-LAB-04-b-R	B
					A4B-LAB-04-b-OR	D
			3.5-4	c	A4B-LAB-04-c-R	B
					A4B-LAB-04-c-OR	D
A4B-LAB-05	479887.37	1348764.29	0-0.5	a	A4B-LAB-05-a-R	B
					A4B-LAB-05-a-OR	D
			1-1.5	b	A4B-LAB-05-b-R	B
					A4B-LAB-05-b-OR	D
			3.5-4	c	A4B-LAB-05-c-R	B
					A4B-LAB-05-c-OR	D
A4B-LAB-06	479866.38	1348860.99	0-0.5	a	A4B-LAB-06-a-R	B
			1-1.5	b	A4B-LAB-06-b-R	B
			3.5-4	c	A4B-LAB-06-c-R	B
A4B-LAB-07	479871.38	1348860.99	0-0.5	a	A4B-LAB-07-a-R	B
			1-1.5	b	A4B-LAB-07-b-R	B
			3.5-4	c	A4B-LAB-07-c-R	B
A4B-LAB-08	479866.38	1348865.99	0-0.5	a	A4B-LAB-08-a-R	B
			1-1.5	b	A4B-LAB-08-b-R	B
			3.5-4	c	A4B-LAB-08-c-R	B
A4B-LAB-09	479861.38	1348860.99	0-0.5	a	A4B-LAB-09-a-R	B
			1-1.5	b	A4B-LAB-09-b-R	B
			3.5-4	c	A4B-LAB-09-c-R	B

LABORATORY BUILDING AREA						
Location	**Northing**	**Easting**	**Depth Below Overlying Material**	**Depth ID[a]**	**Sample ID[b]**	**TAL**
A4B-LAB-10	479866.38	1348855.99	0-0.5	a	A4B-LAB-10-a-R	B
			1-1.5	b	A4B-LAB-10-b-R	B
			3.5-4	c	A4B-LAB-10-c-R	B
A4B-LAB-11	479735.37	1348766.99	0-0.5	a	A4B-LAB-11-a-R	B
					A4B-LAB-11-a-OR	D
			1.5-2	b	A4B-LAB-11-b-R	B
					A4B-LAB-11-b-OR	D
			4-4.5	c	A4B-LAB-11-c-R	B
					A4B-LAB-11-c-OR	D
			7-7.5	d	A4B-LAB-11-d-R	B
					A4B-LAB-11-d-OR	D
			10-10.5	e	A4B-LAB-11-e-R	B
					A4B-LAB-11-e-OR	D
A4B-LAB-12	479720.37	1348751.99	0-0.5	a	A4B-LAB-12-a-R	B
					A4B-LAB-12-a-OR	D
			1.5-2	b	A4B-LAB-12-b-R	B
					A4B-LAB-12-b-OR	D
			4-4.5	c	A4B-LAB-12-c-R	B
					A4B-LAB-12-c-OR	D
			7-7.5	d	A4B-LAB-12-d-R	B
					A4B-LAB-12-d-OR	D
			10-10.5	e	A4B-LAB-12-e-R	B
					A4B-LAB-12-e-OR	D
A4B-LAB-13	479717.98	1348779.93	0-0.5	a	A4B-LAB-13-a-R	B
					A4B-LAB-13-a-OR	D
			1.5-2	b	A4B-LAB-13-b-R	B
					A4B-LAB-13-b-OR	D
			4-4.5	c	A4B-LAB-13-c-R	B
					A4B-LAB-13-c-OR	D
			7-7.5	d	A4B-LAB-13-d-R	B
					A4B-LAB-13-d-OR	D
			10-10.5	e	A4B-LAB-13-e-R	B
					A4B-LAB-13-e-OR	D
A4B-LAB-14	479696.59	1348779.15	0-0.5	a	A4B-LAB-14-a-R	B
					A4B-LAB-14-a-OR	D
			1.5-2	b	A4B-LAB-14-b-R	B
					A4B-LAB-14-b-OR	D
			4-4.5	c	A4B-LAB-14-c-R	B
					A4B-LAB-14-c-OR	D
			7-7.5	d	A4B-LAB-14-d-R	B
					A4B-LAB-14-d-OR	D
			10-10.5	e	A4B-LAB-14-e-R	B
					A4B-LAB-14-e-OR	D

LABORATORY BUILDING AREA						
Location	Northing	Easting	Depth Below Overlying Material	Depth ID[a]	Sample ID[b]	TAL
A4B-LAB-15	479695.93	1348754.00	0-0.5	a	A4B-LAB-15-a-R	B
					A4B-LAB-15-a-OR	D
			1.5-2	b	A4B-LAB-15-b-R	B
					A4B-LAB-15-b-OR	D
			4-4.5	c	A4B-LAB-15-c-R	B
					A4B-LAB-15-c-OR	D
			7-7.5	d	A4B-LAB-15-d-R	B
					A4B-LAB-15-d-OR	D
			10-10.5	e	A4B-LAB-15-e-R	B
					A4B-LAB-15-e-OR	D
A4B-LAB-16	479680.94	1348794.15	0-0.5	a	A4B-LAB-16-a-R	B
					A4B-LAB-16-a-OR	D
			1.5-2	b	A4B-LAB-16-b-R	B
					A4B-LAB-16-b-OR	D
			4-4.5	c	A4B-LAB-16-c-R	B
					A4B-LAB-16-c-OR	D
			7-7.5	d	A4B-LAB-16-d-R	B
					A4B-LAB-16-d-OR	D
			10-10.5	e	A4B-LAB-16-e-R	B
					A4B-LAB-16-e-OR	D
A4B-LAB-17	479669.87	1348779.15	0-0.5	a	A4B-LAB-17-a-R	B
					A4B-LAB-17-a-OR	D
			1.5-2	b	A4B-LAB-17-b-R	B
					A4B-LAB-17-b-OR	D
			4-4.5	c	A4B-LAB-17-c-R	B
					A4B-LAB-17-c-OR	D
			7-7.5	d	A4B-LAB-17-d-R	B
					A4B-LAB-17-d-OR	D
			10-10.5	e	A4B-LAB-17-e-R	B
					A4B-LAB-17-e-OR	D
A4B-LAB-18	479872.37	1348769.12	0-0.5	a	A4B-LAB-18-a-R	B
					A4B-LAB-18-a-OR	D
			1.5-2	b	A4B-LAB-18-b-R	B
					A4B-LAB-18-b-OR	D
			4-4.5	c	A4B-LAB-18-c-R	B
					A4B-LAB-18-c-OR	D
			7-7.5	d	A4B-LAB-18-d-R	B
					A4B-LAB-18-d-OR	D
			10-10.5	e	A4B-LAB-18-e-R	B
					A4B-LAB-18-e-OR	D

HEALTH AND SAFETY BUILDING AREA						
Location	Northing	Easting	Depth Below Overlying Material	Depth ID[a]	Sample ID[b]	TAL
A5-HSB-01	479941.21	1349610.06	0-0.5	A	A5-HSB-01-a-R	B
			3-3.5	B	A5-HSB-01-b-R	B
			6-6.5	C	A5-HSB-01-c-R	B
A5-HSB-02	479820.81	1349575.52	0-0.5	A	A5-HSB-02-a-R	B
			3-3.5	B	A5-HSB-02-b-R	B
			6-6.5	C	A5-HSB-02-c-R	B

ADDITIONAL TECHNETIUM-99 SAMPLING						
Location	Northing	Easting	Depth Below Surface	Depth ID[a]	Sample ID[b]	TAL
A4B-AT-1	480741.8	1348982	0'-0.5'	1	A4B-AT-1-1-R	D
			6.5'-7'	14	A4B-AT-1-14-R	D
A4B-AT-2	480447.9	1348400	0'-0.5'	1	A4B-AT-2-1-R	D
			6.5'-7'	14	A4B-AT-2-14-R	D
A4B-AT-3	480454.4	1348491	0'-0.5'	1	A4B-AT-3-1-R	D
			6.5'-7'	14	A4B-AT-3-14-R	D
A4B-AT-4	480447.6	1348662	0'-0.5'	1	A4B-AT-4-1-R	D
			6.5'-7'	14	A4B-AT-4-14-R	D
A4B-AT-5	480532.1	1349154	0'-0.5'	1	A4B-AT-5-1-R	D
			6.5'-7'	14	A4B-AT-5-14-R	D
A4B-AT-6	480298.7	1348958	0'-0.5'	1	A4B-AT-6-1-R	D
			6.5'-7'	14	A4B-AT-6-14-R	D
A4B-AT-7	479997.8	1348578	0'-0.5'	1	A4B-AT-7-1-R	D
			6.5'-7'	14	A4B-AT-7-14-R	D
A5-AT-8	480025.4	1349188	0'-0.5'	1	A5-AT-8-1-R	D
			6.5'-7'	14	A5-AT-8-14-R	D
A5-AT-9	479853.19	1349577.53	0'-0.5'	1	A5-AT-9-1-R	D
			6.5'-7'	14	A5-AT-9-14-R	D
A5-AT-9	479853.19	1349577.53	0'-0.5'	1	A5-AT-9-1-L	G
			6.5'-7'	14	A5-AT-9-14-L	G
A5-AT-10	479957	1350520.5	0'-0.5'	1	A5-AT-10-1-R	D
			6.5'-7'	14	A5-AT-10-14-R	D

FRL ATTAINMENT SAMPLING						
Location	**Northing**	**Easting**	**Depth Below Overlying Material**	**Depth ID**	**Sample ID**	**TAL**
A4B-FRL-1	480059.0	1348858.0	0-0.5'	a	A4B-FRL-1-a-R	D
			10-10.5'	b	A4B-FRL-1-b-R	D
			12-12.5'	c	A4B-FRL-1-c-R	D
A4B-FRL-1	480059.0	1348858.0	0-0.5'	a	A4B-FRL-1-a-R	E
			10-10.5'	b	A4B-FRL-1-b-R	E
			12-12.5'	c	A4B-FRL-1-c-R	E
A4B-FRL-2	480063.0	1348861.8	0-0.5'	a	A4B-FRL-2-a-M	D
			10-10.5'	b	A4B-FRL-2-b-M	D
			12-12.5'	c	A4B-FRL-2-c-M	D
A4B-FRL-2	480063.0	1348861.8	0-0.5'	a	A4B-FRL-2-a-M	E
			10-10.5'	b	A4B-FRL-2-b-M	E
			12-12.5'	c	A4B-FRL-2-c-M	E
A4B-FRL-3	480805.0	1348893.5	0-0.5'	a	A4B-FRL-3-a-R	D
			6-6.5'	b	A4B-FRL-3-b-R	D
			17-17.5'	c	A4B-FRL-3-c-R	D
			19-19.5'	d	A4B-FRL-3-d-R	D
A4B-FRL-3	480805.0	1348893.5	0-0.5'	a	A4B-FRL-3-a-R	F
			6-6.5'	b	A4B-FRL-3-b-R	F
			17-17.5'	c	A4B-FRL-3-c-R	F
			19-19.5'	d	A4B-FRL-3-d-R	F
A4B-FRL-4	480809.1	1348897.3	0-0.5'	a	A4B-FRL-4-a-M	D
			6-6.5'	b	A4B-FRL-4-b-M	D
			17-17.5'	c	A4B-FRL-4-c-M	D
			19-19.5'	d	A4B-FRL-4-d-M	D
A4B-FRL-4	480809.1	1348897.3	0-0.5'	a	A4B-FRL-4-a-M	F
			6-6.5'	b	A4B-FRL-4-b-M	F
			17-17.5'	c	A4B-FRL-4-c-M	F
			19-19.5'	d	A4B-FRL-4-d-M	F

APPENDIX D

TARGET ANALYTE LISTS

APPENDIX D
TARGET ANALYTE LISTS

TAL 20810-PSP-0004-A

Soil Analysis, Off-Site (ASL B), 0 Samples Specified in PSP

Analyte	WAC Limit	Requested Minimum Detection Limit
Total Uranium	1,030 mg/kg	8.2 mg/kg
Technetium-99	29.1 pCi/g	2.9 pCi/g

* Reported in concentration units (mg/kg) by inductively coupled plasma/mass spectrometry (ICP/MS)

TAL 20810-PSP-0004-B

Soil Analysis, Off-Site (ASL B), 291 Samples Specified in PSP

Analyte	WAC limit	Requested Minimum Detection Limit
Total Uranium	1,030 mg/kg	8.2 mg/kg

TAL 20200-PSP-0008-C

Soil and Water Analysis, On-Site (ASL B), Number of Samples Based on PID Scan

Analyte	Soil FRL/ *OSDF WAC* (μg/kg)	Requested Minimum Detection Limit[a] Waters – μg/L, Soils – μg/kg
Vinyl Chloride[b]	1,300/*1,510*	130
Chloroethane[b,c]	*392,000,000*	39,200,000
1,1-Dichloroethene	410/*11,400*	41
1,2-Dichloroethene[b]	1,600/*11,400*	160
Bromodichloroemethane	4,000/*903*	90
Trichloroethene	25,000/*128,000*	2500
Tetrachloroethene	3,600/*128,000*	360

TAL 20810-PSP-0004-D

Soil Analysis, Off-Site (ASL B), 325 Samples Specified in PSP

Analyte	WAC limit	Requested Minimum Detection Limit
Technetium-99	29.1 mg/kg	2.91 mg/kg

TAL 20810-PSP-0004-E

Soil Analysis, Off-Site (ASL B), 6 Samples Specified in PSP

Analyte	FRL or *WAC*	Requested Minimum Detection Limit
Beryllium	1.5 mg/kg	0.15 mg/kg

TAL 20810-PSP-0004-F

Soil Analysis, Off-Site (ASL B), 8 Samples Specified in PSP

Analyte	FRL or *WAC*	Requested Minimum Detection Limit
Beryllium	1.5 mg/kg	0.15 mg/kg
Arsenic	12 mg/kg	6 mg/kg

TAL 20810-PSP-0008-G
Soil and Water Analysis, Off-Site (ASL B), 2 Samples Specified in PSP

Analyte	FRL - Soil	Requested Minimum Detection Limit Waters - µg/L, Soils - µg/kg
Chloromethane	N/A	10
Bromomethane	8,200 mg/kg	10
Vinyl Chloride	0.13 mg/kg	10
Chloroethane	N/A	10
Methylene Chloride	37 mg/kg	10
Acetone	43,000 mg/kg	50
Carbon Disulfide	5,000 mg/kg	10
1,1-Dichloroethene	0.41 mg/kg	10
1,1-Dichloroethane	N/A	10
Total 1,2-Dichloroethene	0.16 mg/kg	10
Chloroform	45 mg/kg	10
1,2-Dichloroethane	N/A	10
2-Butanone	N/A	50
1,1,1-Trichloroethane	N/A	10
Carbon Tetrachloride	2.1 mg/kg	10
Bromodichloroemethane	4.0 mg/kg	10
1,2-Dichloropropane	N/A	10
Cis-1,3-Dichloropropene	N/A	10
Trichloroethene	25 mg/kg	10
Dibromochloromethane	N/A	10
1,1,2-Trichloroethane	4.3 mg/kg	10
Benzene	850 mg/kg	10
Trans-1,3-Dichloropropene	N/A	10
Bromoform	31 mg/kg	10
4-Methyl-2-pentanone	2,500 mg/kg	50
2-Hexanone	3.6 mg/kg	50
Tetrachloroethene	N/A	10
1,1,2,2-Tetrachloroethene	100,000 mg/kg	10
Toluene	340 mg/kg	10
Chlorobenzene	340 mg/kg	10
Ethylbenzene	5,100 mg/kg	10
Styrene	N/A	10
Xylenes (total)	920,000 mg/kg	10

µg/kg – micrograms per kilogram
µg/L – micrograms per liter

[a] The minimum detection limit is set at 10 percent of the FRL or the WAC, whichever is lower
[b] Not an Area 3B/4B/5 ASCOC, but is a WAC constituent
[c] Does not have a soil FRL